Service Manual

Model : LG-P520

Internal Use Only

# Service Manual

# LG-P520

Date: October, 2010 / Issue 1.0

# Table Of Contents

# 1. INTRODUCTION

## 1.1 Purpose

This manual provides the information necessary to repair, calibration, description and download the features of this model.

## 1.2 Regulatory Information

**A. Security**

Toll fraud, the unauthorized use of telecommunications system by an unauthorized part (for example, persons other than your company's employees, agents, subcontractors, or person working on your company's behalf) can result in substantial additional charges for your telecommunications services. System users are responsible for the security of own system. There are may be risks of toll fraud associated with your telecommunications system. System users are responsible for programming and configuring the equipment to prevent unauthorized use. The manufacturer does not warrant that this product is immune from the above case but will prevent unauthorized use of common-carrier telecommunication service of facilities accessed through or connected to it.

The manufacturer will not be responsible for any charges that result from such unauthorized use.

**B. Incidence of Harm**

If a telephone company determines that the equipment provided to customer is faulty and possibly causing harm or interruption in service to the telephone network, it should disconnect telephone service until repair can be done. A telephone company may temporarily disconnect service as long as repair is not done.

**C. Changes in Service**

A local telephone company may make changes in its communications facilities or procedure. If these changes could reasonably be expected to affect the use of the this phone or compatibility with the network, the telephone company is required to give advanced written notice to the user, allowing the user to take appropriate steps to maintain telephone service.

**D. Maintenance Limitations**

Maintenance limitations on this model must be performed only by the manufacturer or its authorized agent. The user may not make any changes and/or repairs expect as specifically noted in this manual. Therefore, note that unauthorized alternations or repair may affect the regulatory status of the system and may void any remaining warranty.

**E. Notice of Radiated Emissions**

This model complies with rules regarding radiation and radio frequency emission as defined by local regulatory agencies. In accordance with these agencies, you may be required to provide information such as the following to the end user.

**F. Pictures**

The pictures in this manual are for illustrative purposes only; your actual hardware may look slightly different.

**G. Interference and Attenuation**

Phone may interfere with sensitive laboratory equipment, medical equipment, etc. Interference from unsuppressed engines or electric motors may cause problems.

**H. Electrostatic Sensitive Devices**

**ATTENTION**

**Boards, which contain Electrostatic Sensitive Device (ESD), are indicated  by the sign. Following information is ESD handling:**

- Service personnel should ground themselves by using a wrist strap when exchange system boards.
- When repairs are made to a system board, they should spread the floor with anti-static mat which is also grounded.
- Use a suitable, grounded soldering iron.
- Keep sensitive parts in these protective packages until these are used.
- When returning system boards or parts like EEPROM to the factory, use the protective package as described.

## 1.3 Abbreviations

For the purposes of this manual, following abbreviations apply:

| | |
|---|---|
| APC | Automatic Power Control |
| BB | Baseband |
| BER | Bit Error Ratio |
| CC-CV | Constant Current – Constant Voltage |
| DAC | Digital to Analog Converter |
| DCS | Digital Communication System |
| dBm | dB relative to 1 milli watt |
| DSP | Digital Signal Processing |
| EEPROM | Electrical Erasable Programmable Read-Only Memory |
| ESD | Electrostatic Discharge |
| FPCB | Flexible Printed Circuit Board |
| GMSK | Gaussian Minimum Shift Keying |
| GPIB | General Purpose Interface Bus |
| GSM | Global System for Mobile Communications |
| IPUI | International Portable User Identity |
| IF | Intermediate Frequency |
| LCD | Liquid Crystal Display |
| LDO | Low Drop Output |
| LED | Light Emitting Diode |
| OPLL | Offset Phase Locked Loop |

| | |
|---|---|
| PAM | Power Amplifier Module |
| PCB | Printed Circuit Board |
| PGA | Programmable Gain Amplifier |
| PLL | Phase Locked Loop |
| PSTN | Public Switched Telephone Network |
| RF | Radio Frequency |
| RLR | Receiving Loudness Rating |
| RMS | Root Mean Square |
| RTC | Real Time Clock |
| SAW | Surface Acoustic Wave |
| SIM | Subscriber Identity Module |
| SLR | Sending Loudness Rating |
| SRAM | Static Random Access Memory |
| PSRAM | Pseudo SRAM |
| STMR | Side Tone Masking Rating |
| TA | Travel Adapter |
| TDD | Time Division Duplex |
| TDMA | Time Division Multiple Access |
| UART | Universal Asynchronous Receiver/Transmitter |
| VCO | Voltage Controlled Oscillator |
| VCTCXO | Voltage Control Temperature Compensated Crystal Oscillator |
| WAP | Wireless Application Protocol |

# 2. PERFORMANCE

## 2.1 H/W Features

| Item | Feature | Comment |
|---|---|---|
| Standard Battery | Lithium-ion r, 3.7V, 1,500mAh | |
| Stand by TIME | Up to 370 hrs ( Paging Period 5, RSSI -85dBm ) | |
| Talk time | Up to 200min : GSM Tx Level 7 | |
| Charging time | Approx. 4 hours | |
| RX Sensitivity | GSM, EGSM: -109dBm, DCS: -109dBm | |
| TX output power | GSM, EGSM: 33dBm(Level 5),<br>DCS , PCS: 30dBm(Level 0) | |
| GPRS compatibility | Class 12 | |
| SIM card type | 3V Small | |
| Display | MAIN : 2.2" TFT 176 × 220 pixel 262K Color | |
| Status Indicator | Hard icons. Key Pad<br>0 ~ 9, #, *, Up/Down Left/Right Navigation Key<br>Send Key, PWR Key ,Soft Key(Left/Right)<br>Volume up/down, Camera hot key, SIM switch key | |
| ANT | Internal | |
| EAR Phone Jack | Yes | |
| PC Synchronization | Yes | |
| Speech coding | EFR/FR/HR/AMR | |
| Data and Fax | Yes | |
| Vibrator | Yes | |
| Loud Speaker | Yes | |
| Voice Recoding | Yes | |
| Microphone | Yes | |

## 2. PERFORMANCE

| Item | Feature | Comment |
|---|---|---|
| Speaker/Receiver | 18x12Φ Speaker/ Receiver | |
| Travel Adapter | Yes | |
| MIDI | SW MIDI (Mono SPK) | |
| Camera | 2M | |
| Bluetooth / FM Radio | Bluetooth version 2.1 / 76~108MHz supported | |

## 2.2 Technical Specification

<table>
<tr><th>Item</th><th>Description</th><th>Specification</th></tr>
<tr><td>1</td><td>Frequency Band</td><td>EGSM<br>TX: 880 ~ 915MHz<br>RX: 925 ~ 960 MHz<br>DCS<br>TX: 1710 ~ 1785 MHz<br>RX: 1805 ~ 1880 MHz<br>PCS<br>TX: 1850 ~ 1910 MHz<br>RX: 1930 ~ 1990 MHz</td></tr>
<tr><td>2</td><td>Phase Error</td><td>RMS < 5 degrees<br>Peak < 20 degrees</td></tr>
<tr><td>3</td><td>Frequency Error</td><td>< 0.1 ppm</td></tr>
<tr><td>4</td><td>Power Level</td><td>
EGSM
<table>
<tr><th>Level</th><th>Power</th><th>Toler.</th><th>Level</th><th>Power</th><th>Toler.</th></tr>
<tr><td>5</td><td>33dBm</td><td>±2dB</td><td>13</td><td>17dBm</td><td>± 3dB</td></tr>
<tr><td>6</td><td>31dBm</td><td>±3dB</td><td>14</td><td>15dBm</td><td>± 3dB</td></tr>
<tr><td>7</td><td>29dBm</td><td>±3dB</td><td>15</td><td>13dBm</td><td>± 3dB</td></tr>
<tr><td>8</td><td>27dBm</td><td>±3dB</td><td>16</td><td>11dBm</td><td>± 5dB</td></tr>
<tr><td>9</td><td>25dBm</td><td>±3dB</td><td>17</td><td>9dBm</td><td>± 5dB</td></tr>
<tr><td>10</td><td>23dBm</td><td>±3dB</td><td>18</td><td>7dBm</td><td>± 5dB</td></tr>
<tr><td>11</td><td>21dBm</td><td>±3dB</td><td>19</td><td>5dBm</td><td>± 5dB</td></tr>
<tr><td>12</td><td>19dBm</td><td>±3dB</td><td></td><td></td><td></td></tr>
</table>
DCS/PCS
<table>
<tr><th>Level</th><th>Power</th><th>Toler.</th><th>Level</th><th>Power</th><th>Toler.</th></tr>
<tr><td>0</td><td>30dBm</td><td>±2dB</td><td>8</td><td>14dBm</td><td>± 3dB</td></tr>
<tr><td>1</td><td>28dBm</td><td>±3dB</td><td>9</td><td>12dBm</td><td>± 4dB</td></tr>
<tr><td>2</td><td>26dBm</td><td>±3dB</td><td>10</td><td>10dBm</td><td>± 4dB</td></tr>
<tr><td>3</td><td>24dBm</td><td>±3dB</td><td>11</td><td>8dBm</td><td>± 4dB</td></tr>
<tr><td>4</td><td>22dBm</td><td>±3dB</td><td>12</td><td>6dBm</td><td>± 4dB</td></tr>
<tr><td>5</td><td>20dBm</td><td>±3dB</td><td>13</td><td>4dBm</td><td>± 4dB</td></tr>
<tr><td>6</td><td>18dBm</td><td>±3dB</td><td>14</td><td>2dBm</td><td>± 5dB</td></tr>
<tr><td>7</td><td>16dBm</td><td>±3dB</td><td>15</td><td>0dBm</td><td>± 5dB</td></tr>
</table>
</td></tr>
</table>

## 2. PERFORMANCE

<table>
<tr><th>Item</th><th>Description</th><th colspan="2">Specification</th></tr>
<tr><td rowspan="20">5</td><td rowspan="20">Output RF Spectrum<br>(due to modulation)</td><td colspan="2">EGSM</td></tr>
<tr><td>Offset from Carrier (kHz).</td><td>Max. dBc</td></tr>
<tr><td>100</td><td>+0.5</td></tr>
<tr><td>200</td><td>-30</td></tr>
<tr><td>250</td><td>-33</td></tr>
<tr><td>400</td><td>-60</td></tr>
<tr><td>600~ <1,200</td><td>-60</td></tr>
<tr><td>1,200~ <1,800</td><td>-60</td></tr>
<tr><td>1,800~ <3,000</td><td>-63</td></tr>
<tr><td>3,000~ <6,000</td><td>-65</td></tr>
<tr><td>6,000</td><td>-71</td></tr>
<tr><td colspan="2">DCS/PCS</td></tr>
<tr><td>Offset from Carrier (kHz).</td><td>Max. dBc</td></tr>
<tr><td>100</td><td>+0.5</td></tr>
<tr><td>200</td><td>-30</td></tr>
<tr><td>250</td><td>-33</td></tr>
<tr><td>400</td><td>-60</td></tr>
<tr><td>600~ <1,200</td><td>-60</td></tr>
<tr><td>1,200~ <1,800</td><td>-60</td></tr>
<tr><td>1,800~ <3,000</td><td>-65</td></tr>
<tr><td>3,000~ <6,000</td><td>-65</td></tr>
<tr><td>6,000</td><td>-73</td></tr>
<tr><td rowspan="6">6</td><td rowspan="6">Output RF Spectrum<br>(due to switching<br>transient)</td><td colspan="2">EGSM</td></tr>
<tr><td>Offset from Carrier (kHz).</td><td>Max. dBm</td></tr>
<tr><td>400</td><td>-19</td></tr>
<tr><td>600</td><td>-21</td></tr>
<tr><td>1,200</td><td>-21</td></tr>
<tr><td>1,800</td><td>-24</td></tr>
</table>

<table>
<tr><th>Item</th><th>Description</th><th colspan="3">Specification</th></tr>
<tr><td rowspan="6">6</td><td rowspan="6">Output RF Spectrum<br>(due to switching<br>transient)</td><td colspan="3">DCS/PCS</td></tr>
<tr><td colspan="2">Offset from Carrier (kHz).</td><td>Max. dBm</td></tr>
<tr><td colspan="2">400</td><td>-22</td></tr>
<tr><td colspan="2">600</td><td>-24</td></tr>
<tr><td colspan="2">1,200</td><td>-24</td></tr>
<tr><td colspan="2">1,800</td><td>-27</td></tr>
<tr><td>7</td><td>Spurious Emissions</td><td colspan="3">Conduction, Emission Status</td></tr>
<tr><td>8</td><td>Bit Error Ratio</td><td colspan="3">EGSM<br>BER (Class II) < 2.439% @-102 dBm<br>DCS,PCS<br>BER (Class II) < 2.439% @-102 dBm</td></tr>
<tr><td>9</td><td>RX Level Report Accuracy</td><td colspan="3">±3 dB</td></tr>
<tr><td>10</td><td>SLR</td><td colspan="3">8±3 dB</td></tr>
<tr><td rowspan="10">11</td><td rowspan="10">Sending Response</td><td>Frequency (Hz)</td><td>Max.(dB)</td><td>Min.(dB)</td></tr>
<tr><td>100</td><td>-12</td><td>-</td></tr>
<tr><td>200</td><td>0</td><td>-</td></tr>
<tr><td>300</td><td>0</td><td>-12</td></tr>
<tr><td>1,000</td><td>0</td><td>-6</td></tr>
<tr><td>2,000</td><td>4</td><td>-6</td></tr>
<tr><td>3,000</td><td>4</td><td>-6</td></tr>
<tr><td>3,400</td><td>4</td><td>-9</td></tr>
<tr><td>4,000</td><td>0</td><td>-</td></tr>
<tr><td>12</td><td>RLR</td><td colspan="3">2±3 dB</td></tr>
</table>

## 2. PERFORMANCE

<table>
<tr><th>Item</th><th>Description</th><th colspan="3">Specification</th></tr>
<tr><td rowspan="11">13</td><td rowspan="11">Receiving Response</td><td>Frequency (Hz)</td><td>Max.(dB)</td><td>Min.(dB)</td></tr>
<tr><td>100</td><td>-12</td><td>-</td></tr>
<tr><td>200</td><td>0</td><td>-</td></tr>
<tr><td>300</td><td>2</td><td>-7</td></tr>
<tr><td>500</td><td>*</td><td>-5</td></tr>
<tr><td>1,000</td><td>0</td><td>-5</td></tr>
<tr><td>3,000</td><td>2</td><td>-5</td></tr>
<tr><td>3,400</td><td>2</td><td>-10</td></tr>
<tr><td>4,000</td><td>2</td><td></td></tr>
<tr><td colspan="3">* Mean that Adopt a straight line in between 300 Hz and 1,000 Hz to be Max. level in the range.</td></tr>
<tr><td>14</td><td>STMR</td><td colspan="3">18±5 dB</td></tr>
<tr><td>15</td><td>Stability Margin</td><td colspan="3">> 6 dB</td></tr>
<tr><td rowspan="9">16</td><td rowspan="9">Distortion</td><td colspan="2">dB to ARL (dB)</td><td>Level Ratio (dB)</td></tr>
<tr><td colspan="2">-35</td><td>17.5</td></tr>
<tr><td colspan="2">-30</td><td>22.5</td></tr>
<tr><td colspan="2">-20</td><td>30.7</td></tr>
<tr><td colspan="2">-10</td><td>33.3</td></tr>
<tr><td colspan="2">0</td><td>33.7</td></tr>
<tr><td colspan="2">7</td><td>31.7</td></tr>
<tr><td colspan="2">10</td><td>25.5</td></tr>
<tr><td>17</td><td>Side Tone Distortion</td><td colspan="3">Three stage distortion < 10%</td></tr>
<tr><td>18</td><td>System frequency (26 MHz) tolerance</td><td colspan="3">≤ 2.5 ppm</td></tr>
<tr><td>19</td><td>32.768KHz tolerance</td><td colspan="3">≤ 30 ppm</td></tr>
<tr><td>20</td><td>Ringer Volume</td><td colspan="3">At least 65 dBspl under below conditions:<br>1. Ringer set as ringer.<br>2. Test distance set as 50 cm</td></tr>
</table>

<table>
<tr><th>Item</th><th>Description</th><th colspan="2">Specification</th></tr>
<tr><td>21</td><td>Charge Current</td><td colspan="2">Fast Charge : Typ. 650 mA<br>Slow Charge : Typ. 80mA<br>Total Charging Time : < 4 hours</td></tr>
<tr><td rowspan="8">22</td><td rowspan="8">Antenna Display</td><td>Bar Number</td><td>Power</td></tr>
<tr><td>7</td><td>-92 Over</td></tr>
<tr><td>7 -> 5</td><td>-93 ± 2</td></tr>
<tr><td>5 -> 4</td><td>-98 ± 2</td></tr>
<tr><td>4 -> 2</td><td>-101 ± 2</td></tr>
<tr><td>2 -> 1</td><td>-104 ± 2</td></tr>
<tr><td>1 -> 0</td><td>-106 ± 2</td></tr>
<tr><td>0 -> OFF</td><td>-106 Under</td></tr>
<tr><td rowspan="5">23</td><td rowspan="5">Battery Indicator</td><td>Battery Bar Number</td><td>Voltage</td></tr>
<tr><td>3</td><td>≥ 3.77</td></tr>
<tr><td>3 -> 2</td><td>3.77 ± 0.05 V</td></tr>
<tr><td>2 -> 1</td><td>3.67 ± 0.05 V</td></tr>
<tr><td>1 -> 0</td><td>3.60 ± 0.05 V</td></tr>
<tr><td rowspan="2">24</td><td rowspan="2">Low Voltage Warning<br>( Blinking Bar)</td><td colspan="2">≤ 3.60 ± 0.05V (Call), one time per one minute</td></tr>
<tr><td colspan="2">≤ 3.60 ± 0.05V (Standby), one time per three minute</td></tr>
<tr><td>25</td><td>Forced shut down<br>Voltage</td><td colspan="2">3.33 ± 0.05V</td></tr>
<tr><td>26</td><td>Sustain RTC<br>without battery</td><td colspan="2">Over 50 hours</td></tr>
<tr><td>27</td><td>Battery Type</td><td colspan="2">Lithium-Ion Battery<br>Standard Voltage = 3.7 V<br>Battery full charge voltage = 4.2 V<br>Capacity: 1,500mAh</td></tr>
<tr><td>28</td><td>Travel Charger</td><td colspan="2">Switching-mode charger<br>Input: 100 ~ 240V, 50/60 Hz<br>Output: 5.1V, 700 mA</td></tr>
</table>

# 3. TECHNICAL BRIEF

## 3.1 Functional Block Diagram

The functional component arrangement is mentioned below diagram.

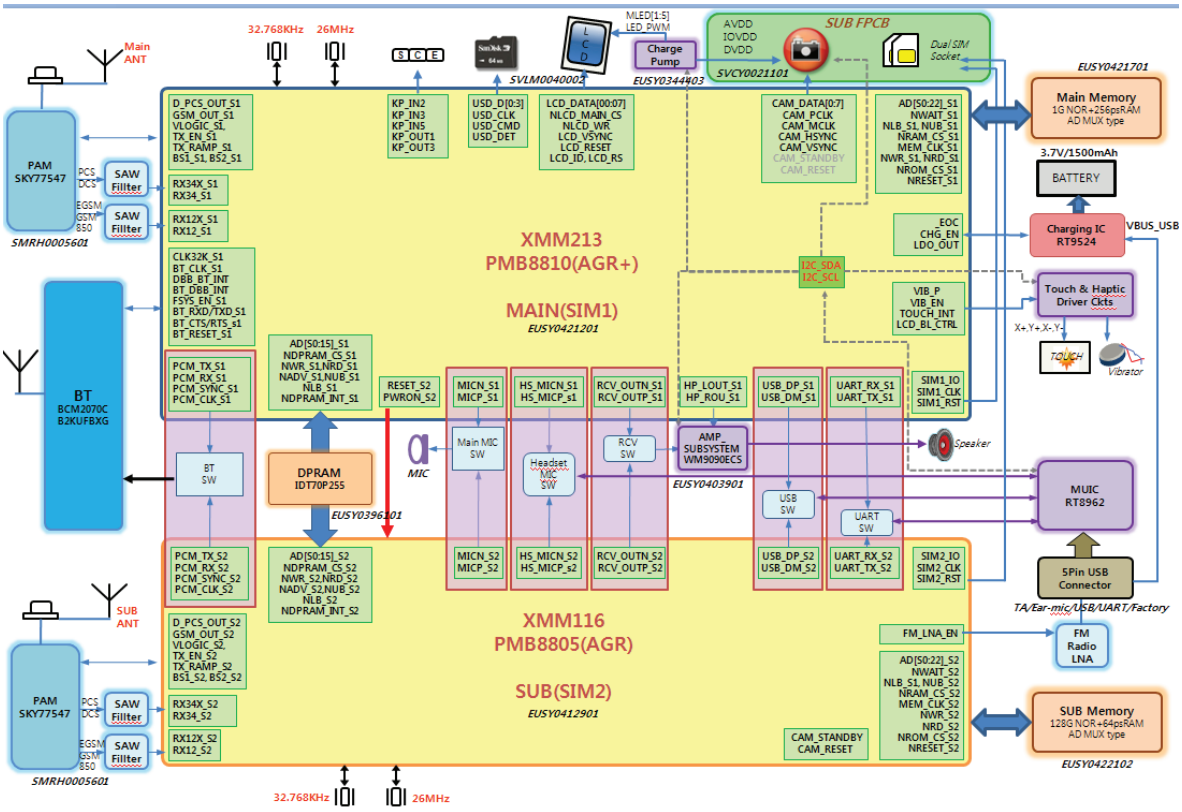



**Figure. 3.1.1 Functional Block Diagram**

## 3.2 Digital Main Processor (PMB8810, U101/U401)

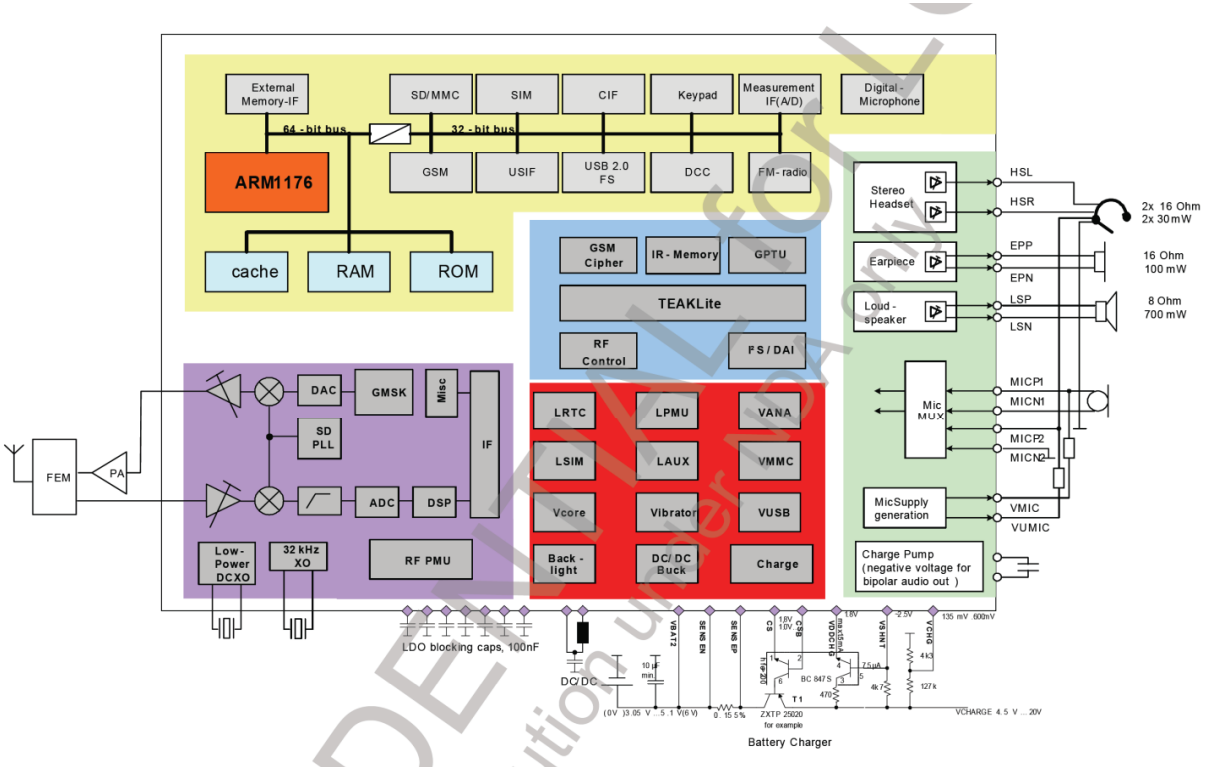



**Figure. 3.2.1 X-Gold tm 213 Hardware Block Diagram**

### 3.2.1 General

Technology:
– SoC, Monolithic, 65 nm CMOS
• Package:
– eWLB, 8x8x0.8 mm
– 0.5 mm pitch
– 217 balls / 6-layer PCB

### 3.2.2 RF Transceiver

• Dual-band direct conversion receiver
• Tri/Quad-band possible with external circuitry
• Fully integrated digital controlled X0
• Additional buffer for 2 external system clocks
• Fully digital RF-Synthesizer incl. ΣΔ-Transmitter

### 3.2.3 Baseband

• DSP:
– 156 MHz TeakLite™
• MCU:
– ARM1176® @ 208 MHz
• MCU RAM:
– 3.00Mbit
• Memory I/F:
– 512 Mbit (can be extended to 2 Gbit in AD-Mux/Demux, and up to 4 Gbit in AAD-Mux mode)
• Modem:
– GPRS class 12, (RX/TX CS1-CS4)
– EGPRS class 12, (RX MCS1-MCS9, TX MCS1-MCS4)
• Cipher Units:
– A51/2/3
– GEA-1/2/3
• Security:
– OMTP TR0
– Secure Boot
– RSA(ROM)/SHA-1(HW accel.)
– OCDS disabling
– Certificate Management

• Speech Codec:
– FR / HR / EFR / NB-AMR
• Audio Codec (running on ARM1176):
– SP-MIDI
– SB-ADPCM
– MP3
– WB-AMR
– AAC/AAC+/eAAC+
• Others:
– DARP (SAIC)
– TTY
• Customization:
– E-Fuses

### 3.2.4 External Memory

• External Bus Unit
– 25-bit address bus (512 Mbit) - can be extended to 27 address bits (2 Gbit)
– 16-bit data bus
– 1.8V & 2.8V support
• Flash / RAM
– NOR Type
– Serial Flash SPI and SPI-4
– Parallel Flash (Page & Burst Mode)
- 16-bit Demultiplexed
- 16-bit AD-multiplexed
- 16-bit AAD-multiplexed
– iNAND Type e.g. oneNAND
• Memory card
– SD/MMC card interface with 1 or 4 data lines

### 3.2.5 Connectivity

• 3xUSIF (configurable either as SPI or UART), I2C, I2S; Interfaces @ 1.8V
• Direct (U)SIM 1.8/3V
• USB2.0 up to 480 Mbit/s (High Speed) w/ external USB Phy over ULPI interface
• Stereo Headset (Amplifier integrated)
• 3 external analog measurement PIN's
• Bluetooth, A-GPS, WLAN support (I2C, I2S, SPI)

### 3.2.6 Mixed Signal

• Improved audio performance
• Loudspeaker Audio Class D Amplifier, 700 mW@8 Ω mono for hands-free and ringing
• Stereo Headset 2x30 mW@16 Ω w/o coupling C
• Mono Earpiece 100 mW@16 Ω
• Digital microphone supported
• Differential microphone inputs

### 3.2.7 FM Radio

• Integrated FM radio
– FM Stereo RDS Receiver
– Sensitivity 2 µV EMF
– Support for US & EU bands
– Stereo recording

### 3.2.8 Power Management

• Direct-to-Battery Connection
– LDOs (incl. capless)
– DC/DC step-down converter
• Battery Type
– Li-Ion
• Charging control
– Battery temperature
– Watchdog protection
– Start-up on flat battery
• External Charger
– Switch mode
• USB battery charging
– USB charging spec 1.0 compliant

### 3.2.9 Display

• Type
– 320*240, QVGA, 262k color (parallel)
• Interface
– Parallel 8/9bit MIPI-DBI Type B
– Serial MIPI-DBI Type C
– Interf. voltage at 1.8V or 2.8V
• gRacr - Display Controller (Hardware)
– 30 fps Display update without DMA (up to 60 fps) (full or partial)
– Video post processing Scaling, Rotation (90° steps), Mirroring
– Overlay with alpha blending
– Color conversion YUV -> RGB
– 2D vector graphics (Lines, filled rectangles, Bit block transfer (e.g. sprites, scrolling, antialiased bitmap fonts)

### 3.2.10 Camera

• 2.0 Mpx CMOS
• HW JPEG encoder (39 Mpx/sec)
• 39 MHz Pixel Rate
• 15 fps@2.0 Mpx full resolution

### 3.2.11 Video Capabilities

• Video Decoding MPEG-4/H.263
– QCIF@30 fps
– QVGA@15fps
• Video Encoding MPEG-4/H.263
– QCIF@15 fps

### 3.2.12 Audio Capabilities

• Polyphonic ring tones
– 64 voices MIDI, SP-MIDI
– FM synthesizer
• AMR-WB
• True ring tones (MP3)
• MP3, eAAC+
• G.722 SB-ADPCM encoding/decoding

## 3.3 Power Management

A mobile platform requires power supplies for different functions. These power supplies are generated in the integrated power management Unit (PMU). The PMU is designed to deliver the power for a typical standard phone.

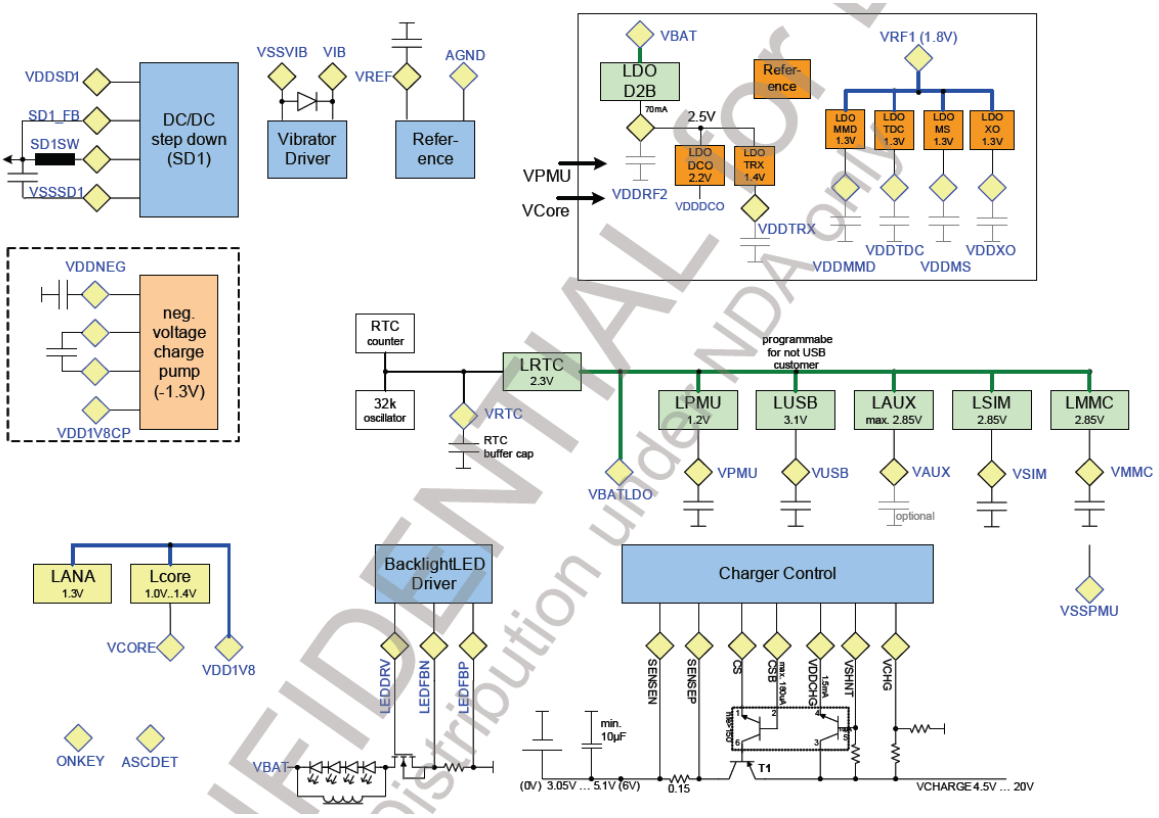



**Figure. 3-2-1 Block Figure of the PMU Modules X-Gold tm 213**

- **DC/DC Step Down Converter for 1.8V (SD1)**

The DC/DC converter generates a 1.8V supply rail. This voltage rail is used to supply main parts of the system, like the digital core of the chip (via LDO LCORE), some parts of the mixed signal macro, parts of the RF macro and the external memory if a 1.8V memory is used. The efficiency of the DC/DC converter is optimized for an average load current of 100mA. That is the load current estimated for the GSM talk mode.

**▪ Linear voltage Regulators (low dropout) LDOs**
The LDOs are used to generate the supply for the different supply domains not directly supplied out of the DC/DC converter.
The VSIM output current is high enough to drive USB SIM cards.

**▪ LCORE**
The LCORE LDO provides the VCORE supply used for most of the digital parts of the chip

**▪ LPMU**
The LPMU provides VPMU sued for the PMU supply, e.g. for the startup state machine and analog parts like ADC, sense amplifier etc.

**▪ LUSB**
The LUSB LDO generates the supply for the USB transceiver (output driver and input). If no USB interface is required, LUSB can be used as general purpose LDO.

**▪ LAUX**
The LAUX generates VAUX. It is a general purpose LDO and can be used for different functions depending on the phone application, e.g. for the display or Camera.

**▪ LMMC**
The LMMC generates VMMC. It is a general purpose LDO and can be used e,g. for memory cards

**▪ LSIM**
The LSIM LDO generates the VSIM supply for the SIM card and interface. It is designed to supply Standard SIM cards.

**▪ Other LDOs**
The RF module has implemented several LDO's for different RF Power domain.
The mixed signal module has some LDO's for the audio driver and microphone supply.

| Supply Domain LDO Name | Voltage | Max. Current | Output Cap | Input Domain | Comment |
|---|---|---|---|---|---|
| VBAT | 0 ... 6.0 V | | | | Operating range is 3.05 V ... 5.5 V, system emergency switch off voltage is about 2.8 V |
| VDD1V8 | 1.8 V | 450 mA | 22 µF | VBAT | This voltage is generated by the DC/DC converter with 3.3 µH inductor, The voltage is used for: Memory supply, and via LDO's for digital core supply, mixed signal supply and RF supply. |
| LCORE | 1.2 V | 300 mA | 2x100 nF | VDD1V8 | |
| LANA | 1.3 V | 10 mA | No | VDD1V8 | No ball |
| LRTC | 2.3 V | 2 mA | >=100 nF | VBAT | This supply is only used for the HPBG, the 32.768 kHz oscillator and the real-time clock counter required during the sleep- and low-power mode. |
| LPMU | 1.2 V | 15 mA | 100 nF | VBAT | Supply for the digital part of the PMU including digital control of DC/DC converter. This voltage is also used for the N-DEMOS driver of DC/DC converter and the class-D amplifier and the core PLL. |
| LUSB | 3.1 V | 40 mA | 100 nF | VBAT | Used for the USB driver supply or as general purpose LDO with programmable output voltages (2.5 V, 2.85 V, 3.1 V) |
| LAUX | 1.5 V ... 2.85 V | 150 mA | 470 nF | VBAT | General purpose LDO for e.g. Display, Bluetooth, Camera etc. Programmable output voltages are (1.5 V, 1.8 V, 2.5 V, 2.85 V) |
| LSIM | 1.8 V / 2.85 V | 30 mA | >=100 nF | VBAT | LDO dedicated to the SIM-Card supply. It is chip internal connected to the SIM interface driver. |
| LMMC | 1.5 V ... 2.85 V | 150 mA | >=470 nF | VBAT | General purpose LDO, targeted for MMC/SD card supply. |
| VDDNEG | -1.3 V | 100 mA | 100 nF | VDD1V8 | Negative voltage for the bipolar headset audio driver. Generated by a charge pump. |

**Table. 3.3.1 Power supply Domains (without RF)**

### 3.3.1 Power on and startup

- **Analog startup Circuit**

Because the POR circuit and the LPBG are directly connected to the battery, it is not possible to switch them off. If the battery voltage exceed the power on reset threshold (2.5V), the power on reset is released, the LPMU regulator and the LRTC voltage regulator are switched on. The LPMU regulator starts in its ultra-low power mode

The LPMU regulator generates a control signal (lpmu_OK) that enables the 50KHZ PMU oscillator. The output clock of the oscillator is checked with a fully coded counter. A counter overflow releases the reset (vpmu_rst_n) signal for the small PMU state-machine.

- **Small first digital State-Machine**

The small PMU state-machine is always connected to VPMU After starting from reset the small startup state machine enters the SYSTEM OFF state and only continuous the startup procedure if a switch on event like first connect, on-key, wake up or charge detect occurs.

- **PMU-main State-Machine**

The main PMU state-machine is always connected to VPMU also. The power up sequence driven by the PMU state-machine can be seen in Figure18. After enabling the reference (HPGB) and waiting for the settling time, the battery voltage is measured and compared with the power on threshold. If the battery voltage is high enough, the SD1 DC/DC converter and the LCORE LDO are started. A timer ensures that the supply voltage will be stable before the DCXO is enabled. The DCXO settling time is ensured using a fixed timer. After an overflow of this timer, the reset is released for the rest of the system. The PMU state machine remains in this System-ON state until the system is switched into the OFF state. For example the system sleep mode is completely configured by software( for example switching off the LDO's, switching of the DCXO etc.) and controlled by the VCXO_enable signal. The reason for the startup is stored in the ResetSourceRead register.

▪ **Battery Measurement**

The ADC and the oscillator for the ADC needs the VDD_ADC supply voltage from the LADC LDO. LADC uses either the charger voltage VDD_CHARGE or VDDRTC as input voltage. The input voltage is selected automatically by a bulk switch circuit. LADC, the ADC and the oscillator are enabled on request for every battery measurement if the charger unit is not running. This is handled by an ADC control block in one of the state-machines. If the charger unit is running the ADC is controlled by the charger state-machine

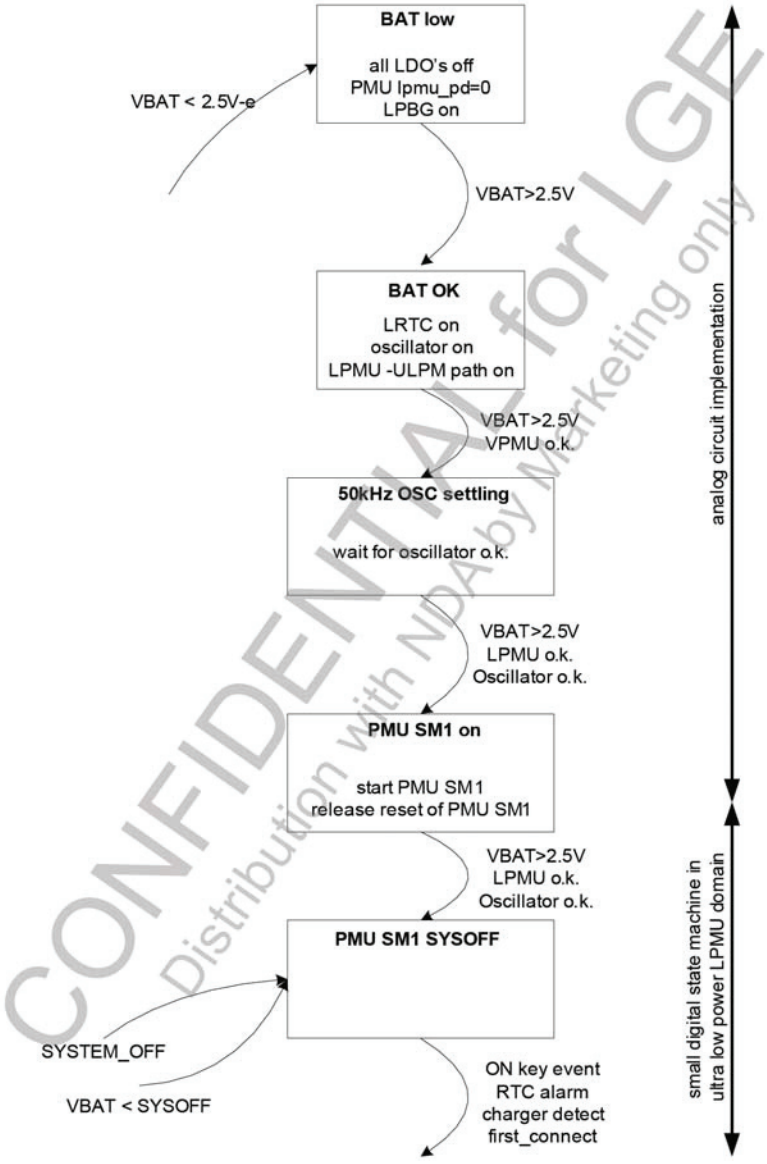



**Figure.3.3.2 First Part of the State Machine, Running in Different Power Domains than the Second Part**

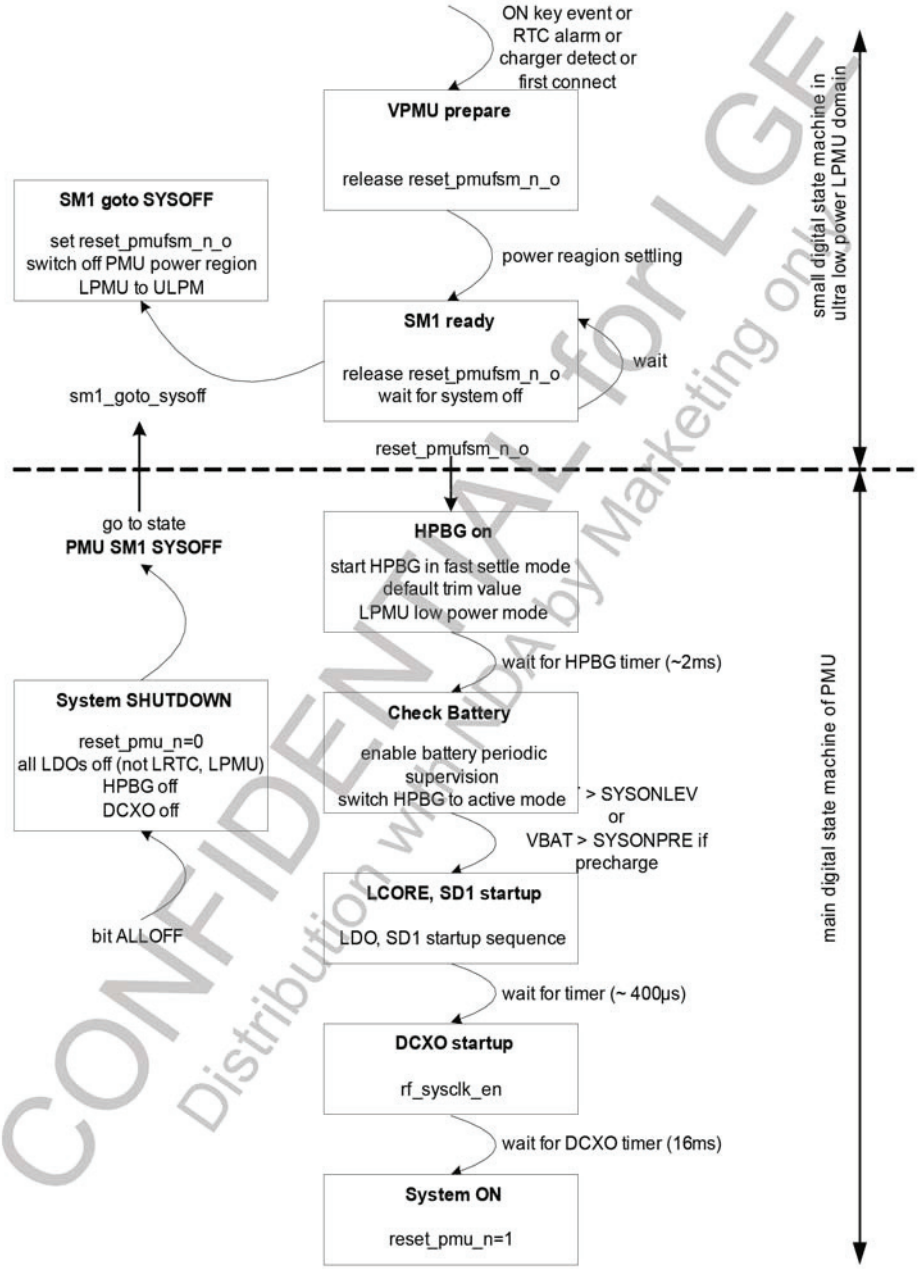



**Figure 3.3.3 Second (Main) Part of the Startup State Machine in the VPMU Domain**

### 3.3.2 Switching on due to first connect

If the battery voltage is connected the first time, that means the system enters the first time the SYSOFF state, this is stored in a first connect flag. If the first connect flag is set, the system will start immediately and not wait for any other system on event in the SYSOFF state.

### 3.3.3 Switching on due to on-Key event

The on key is connected to the ONKEY pad. The ESD protection and the input structure of this pad are connected to VRTC. If the ONKEY pad is forced to VRTC by an external key or similar circuit, the system starts. The ONKEY is sampled with the PMU clock. It has to be sampled four times high before a valid on event is generated. The status of the ON key can be read in the PMU registers, so it can be used as a functional key during phone operation also.

### 3.3.4 Switching on due to RTC alarm

The real time clock can generate a wakeup signal called RTC alarm. This signal is sampled from the state-machine and after successfully detecting a high, the system is switched on.

### 3.3.5 Switching on due to charging

When a battery with a voltage below the SSONLEV level is inserted, the state machine will not start the system. As long as the battery voltage stays lover than SYSONLEV the system will stay off. The only possibility to start up the system is due to an external charger.

If an external charger is connected and detected and the battery is charged above the SYSONPRE voltage level the system will start up.

The PMU main state machine waits in the Check battery state until the battery voltage condition is fulfilled. The charger state machine provides the necessary pre-charge indication signal. This pre-charge signal is denounced in a small counter to have a stable signal. This is important, especially in half/full-wave charging where the charger detection is switching between charger detected/not detected according the AC supply frequency. Reasons for details on pre-charging see the charger chapter. The charger is controlled by an independent state machine. The pre-charge signal is used to trigger the pre-charge signal is used to trigger the pre-charge functionality. The charger state machine fully control the pre-charge, the PMU-state machine now changes to state HPBG on  state and the system starts. This state change is indicated to the charger state-machine to enable the charger watchdog for safety.

### 3.3.6 Power Supply Start-up sequence

In order to avoid an excessive drop on the battery voltage caused by in-rush current during system power-on, possibly leading to system instability and “hick-ups” a staggered turn-on approach for the regulators is implemented. The regulators are turned on in a well defined sequence, thus spreading the in-rush current transients over time.

The IO’s of X-GOLD TM 213 are isolated in OFF mode (core supply is off). The isolation signal is controlled by the PMU state machine. This ensures that the PADs are in a well defined state during core supply settling. This allows to power up the LCORE core regulator and wait for the core to reach reset state before powering up the I/O supply regulators.

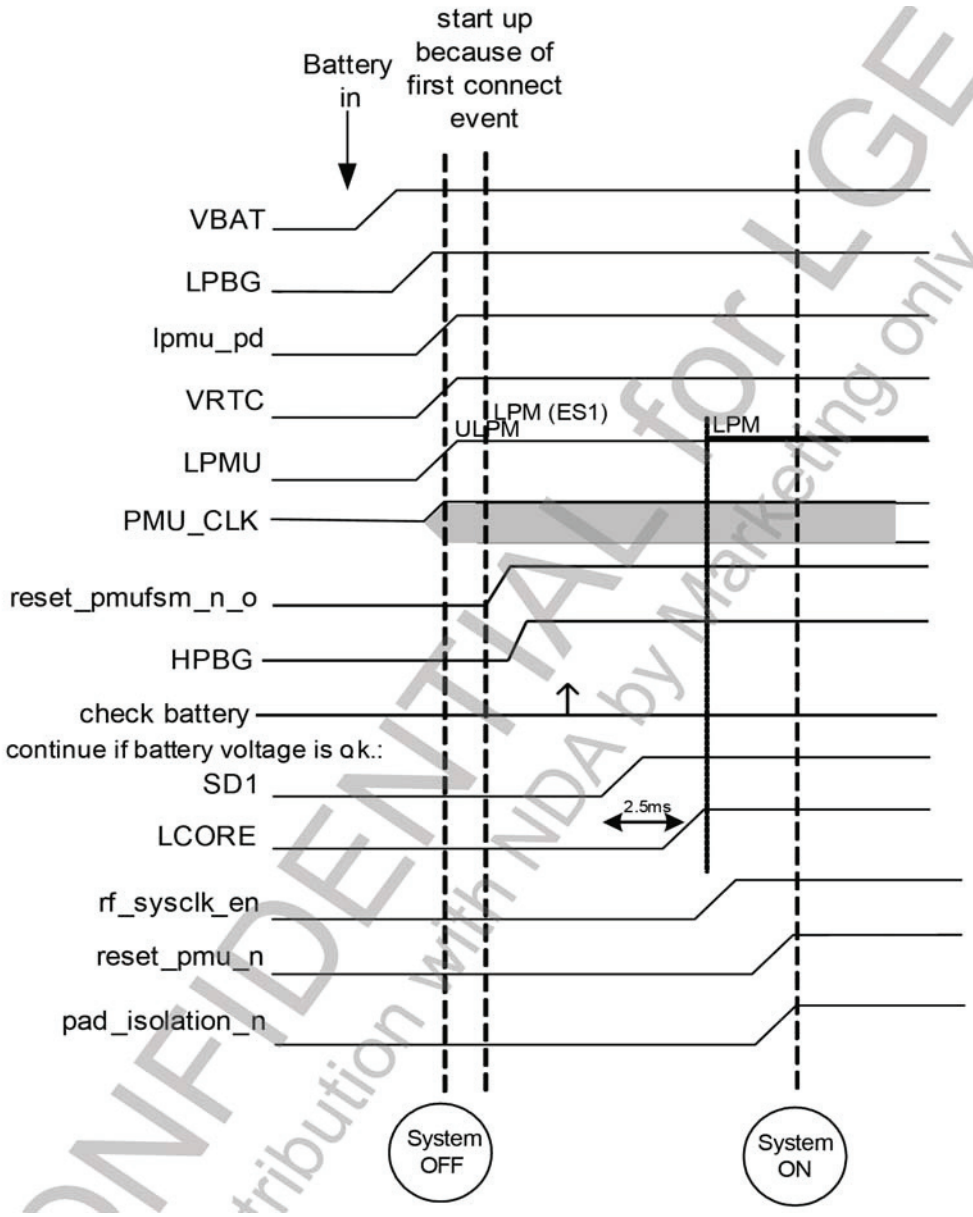



**Figure 3.3.4 Start Up Sequence (triggered by First Connect Event)**

### 3.3.7 External Reset Handling

The chip reset can be controlled by an external RESET_N ball. If this ball is pulled low, the chip will be reset. All PMU registers are reset during the external reset including LSIM control bits. The PMU statemachines are also not reset from the external reset. An SW or watchdog reset will not reset the PMU registers. A SW and Watchdog reset is seen on the reset_n pad to allow the reset of external devices. Basically there are three reset sources, first the reset signal controlled by the PMU (reset_pmu_n_o), second the reset signal controlled by the SCU (resetout_o) and third the external reset (RESET_N). The SCU reset is triggered by SW (for example due to a SW reset or watchdog reset). The PMU reset is controlled by the PMU state machine. The output of the reset handling block is the reset_postscu_n_o signal. This signal controls for example the µC subsystem and releases reset for the controller. During normal start up, the PMU releases the reset_pmu_n_o signal after entering the SYSTEM ON state. At this time the resetout_o signal is high, the RESET_N pad is not pulled low and therefore the reset_postscu_n_o signal follows the reset_pmu_n_o signal. That means the µC reset will be released and the µC starts operation. If the SW triggers an external reset via the SCU, signal resetout_o will be forced to low for a certain time and RESET_N will be forced to low by the open drain driver. At the same time the feedback to the SCU will be masked to not reset the baseband. The RESET_N pad is in the VDDRTC domain but the internal pull up is connected to the VDD_VDIG1 (1.8V) domain. That allows the pad to be used as reset for external devices running in the VDD1V8 domain. The RESET_N pad can also be used to monitor the chip internal reset condition during startup.

The open drain driver is a weak driver, that means it can be forced to high during debug from external pushing some current into the pad. In testmode signal reset_pmu_n_o is high, that means the chip reset is fully controlled from external.

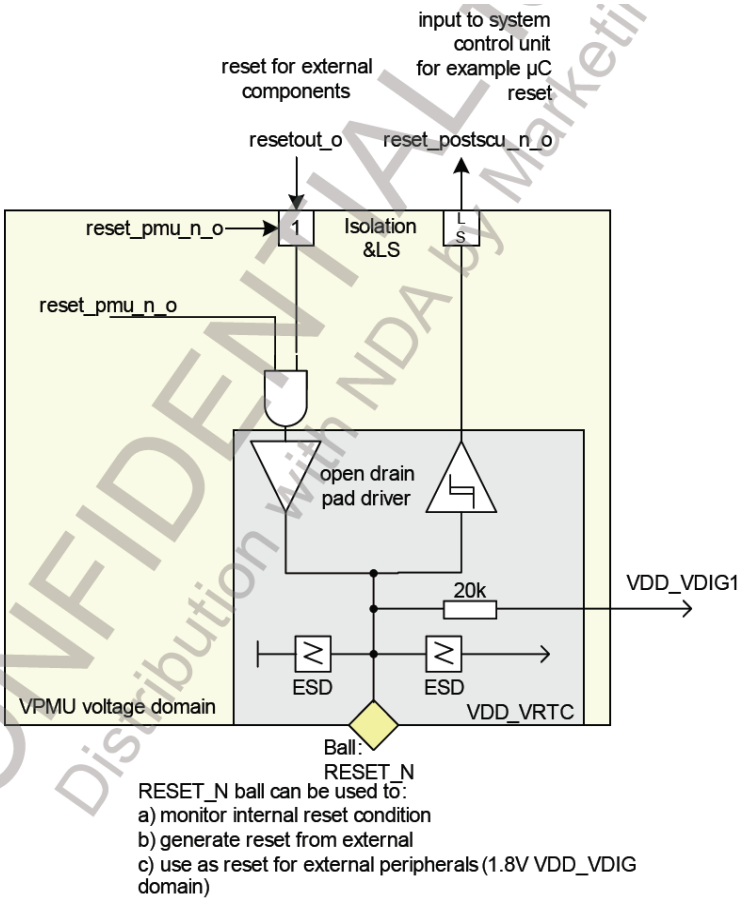



**Figure 3.3.5 PMU, CGU and External Reset**

### 3.3.8 Sysclock Switching

The PMU controls the rf_sysclk_en signal of the DCXO in the RF macro. During startup the PMU enables the DCXO. After the system is running the DCXO is controlled by the SCU of the baseband by using the vcxo_enable signal. This is handled by a dedicated logic in the PMU, see **Figure 3.3.6**. As long as rf_sysclk_en_pmu, the output of the PMU state-machine is high, vcxo_enable controls the rf_sysclk_en signal to the RF. If rf_sysclk_en_pmu is low, the DXCO is switched off, independent from vcxo_enable.

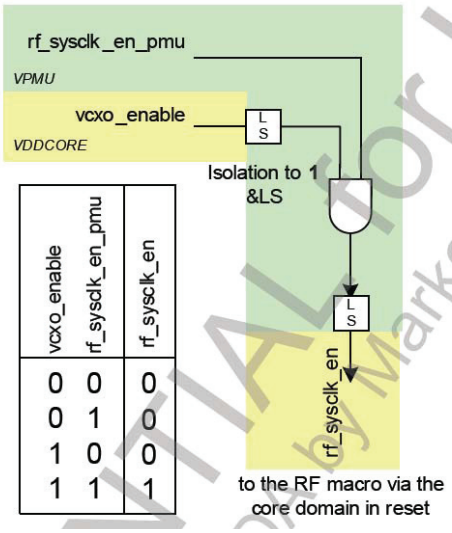



**Figure 3.3.6 How sysclock Enable is Routed in the PMU**

### 3.3.9 Undervoltage Shutdown

In active mode the PMU periodically measures the battery voltage using the ADC from the charger unit. If the battery is measured to be below the programmable shut-down level (called SYSOFF), the system changes to OFF mode. This is done via the SHUTDOWN state of the PMU state machine. (see chapter switch OFF)

### 3.3.10 Software Reset

A software reset does not affect any PMU register. The PMU register are reset with the reset_pmufsm_no signal. That means all PMU register are reset in OFF state. For details about the SW reset see chapter **External Reset Handling**

### 3.3.11 PMU Clock

During the first startup (for example plugging in a battery) a PMU internal oscillator is used for generation of the PMU clock (pmu_clock). The frequency is slightly above 32 kHz (typ. 50 kHz) to be out of the audio band also for worst case devices. After first startup the software shall enable the 32 kHz crystal oscillator. It is not possible to use the 32 kHz oscillator during first startup, because the settling time of the oscillator can be quite long. After the 32 kHz oscillator is running and settled the software shall switch the PMU clock to the 32 kHz clock and disable the internal PMU oscillator for power saving reasons. The 32 kHz oscillator shall never be disabled after the PMU clock has been switched. The ADC in the charger unit has it's own oscillator generating a frequency of about 10 MHz. This oscillator is running during charging and during battery measurements triggered by the PMU. It is off otherwise.

### 3.3.12 System Sleep Mode

The sleep mode is controlled by using the VCXO_enable signal. This signal is used to switch the LDO's and the DC/DC converter SD1 in a programmable way into its low power mode (PFM). In addition DC/DC converter SD1 can be configured to change the output voltage to a lower value for additional power saving. VCXO_enable is also used to deactivate the HPBG and setting LDO LPMU in the ultra-low-power mode. In addition the DCXO is switched off by the VCXO_enable signal. The VCXO_enable signal is also used to switch some LDO's (software configured) to sleep and/or off mode or to change the output voltages of said LDO's. The state of the main PMU state machine is not changed due to VCXO_enable.

### 3.3.13 DC/DC Pre-Load Register Handling

The DC/DC converter works in different modes. If the mode is switched from PFM to PWM the pulse-width of the DC/DC converter depends on the current battery voltage (and on the output voltage). The PMU state-machine knows the battery voltage because of the battery supervision function. Depending on this value it selects a startup pulse-width for the DC/DC converter out of a register table. (4-values)

### 3.3.14 Power Down Sequence

Setting bit OFF in the GeneralControl register switches the system into OFF mode. After the turn off event, the state-machine switches to the SHUTDOWN state. The reset_pmu_n_o signal changes to low, the I/O pads are isolated using the padisolation_n signal, the LCORE LDO and the SD1 DC/DC converter are switched off, the LPMU LDO is switched to ultra-low power mode, the DCXO is turned off and the bandgap buffer is disabled. Before switching OFF the software shall have enabled the 32 kHz oscillator and has switched the PMU clock to the 32 kHz clock to archive the target OFF current .

## 3.4 FEM with integrated Power Amplifier Module (SKY77547, U301, U302)

### 3.4.1 Internal Block Diagram

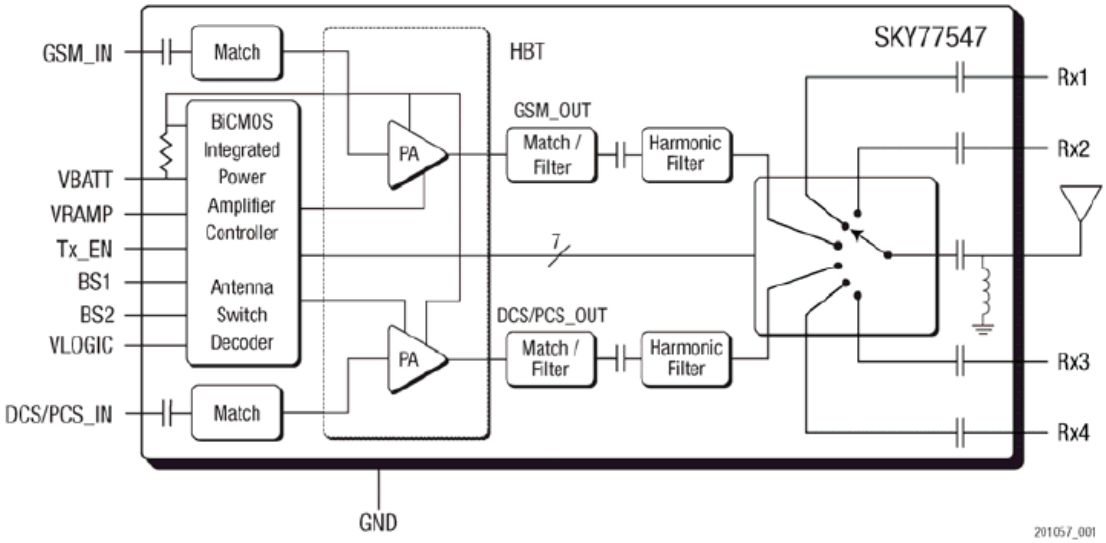



**Figure. 3.4.1 SKY77547 FUNCTIONAL BLOCK DIAGRAM**

### 3.4.2 General Description

The **SKY77547** is a transmit and receive front-end module (FEM) with Integrated Power Amplifier Control for quad-band cellular handsets comprising GSM850/900 and DCS1800/PCS1900 operation. Designed in a low profile, compact form factor.
The FEM also supports Class 12 General Packet Radio Service (GPRS) multi-slot operation.
The module consists of a GSM850/900 PA block and a DCS1800/PCS1900 PA block, impedance matching circuitry for 50 Ω input and output impedances, TX harmonics filtering, high linearity and a low insertion loss PHEMT RF switch, and a Power Amplifier Control (PAC) block with internal current sense resistor. A custom BiCMOS integrated circuit provides the internal PAC function and decoder circuitry to control the RF switches. The two Heterojunction Bipolar Transistor (HBT) PA blocks are fabricated onto a single Gallium Arsenide (GaAs) die. One PA block supports the GSM850/900 bands and the other PA block supports the DCS1800/PCS1900 bands. Both PA blocks share common power supply pads to distribute current. The output of each PA block and the outputs to the four receive pads are connected to the antenna pad through a PHEMT RF switch. The GaAs die, PHEMT die, Silicon (Si) die and passive components are mounted on a multi-layer laminate substrate. The assembly is encapsulated with plastic overmold.

| Mode | VLOGIC | Input Control Bits | | |
|---|---|---|---|---|
| | | TX_EN | BS1 | BS2 |
| STANDBY | 0 | X | X | X |
| RX1 | 1 | 0 | 0 | 0 |
| RX2 | 1 | 0 | 0 | 1 |
| RX3 | 1 | 0 | 1 | 1 |
| RX4 | 1 | 0 | 1 | 0 |
| LB_TX | 1 | 1 | 0 | X |
| HB_TX | 1 | 1 | 1 | X |

1. X = DON'T CARE
2. RX1, RX2, RX3, and RX4 are broadband receive ports and each supports the GSM850, GSM900, DCS, and PCS bands.

**Table 3.4.1 Band SW Logic Table**

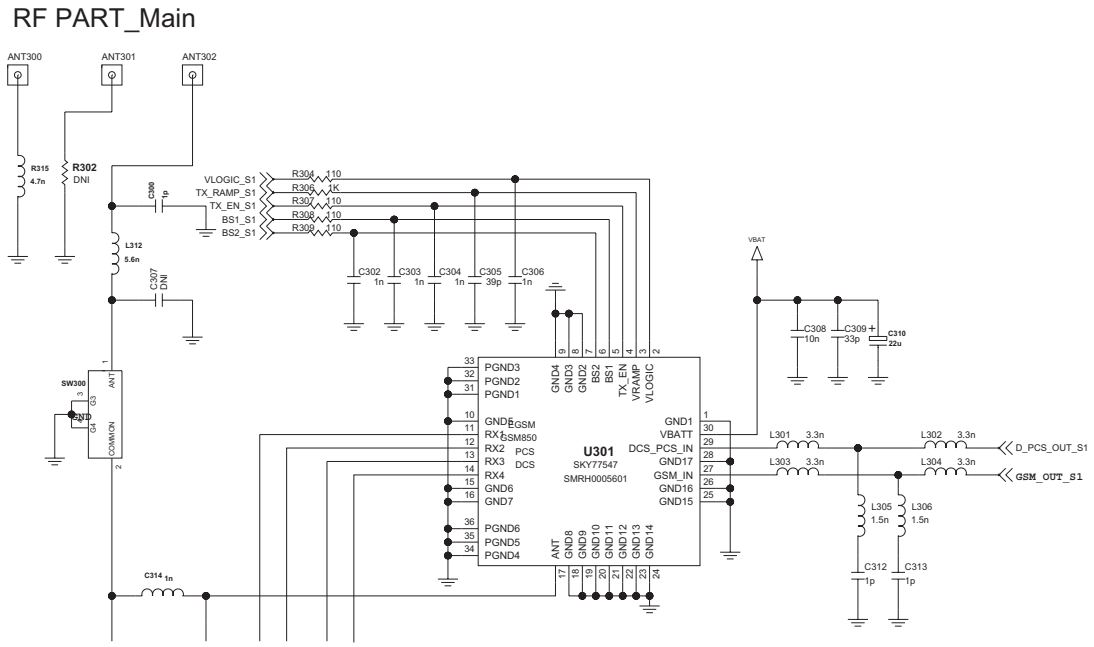
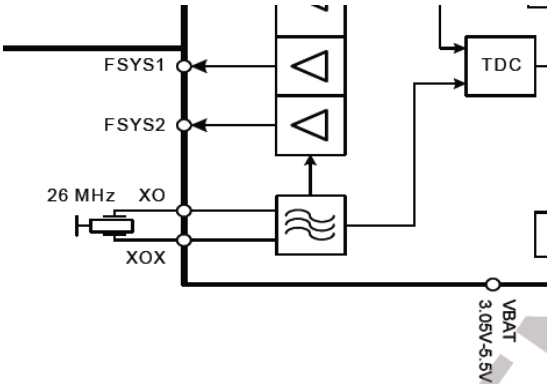



**Figure 3.4.2 FEM CIRCUIT DIAGRAM**

## 3.5 Crystal(26 MHz, X100, X400)




The X-GOLDTM213 RF-Subsystem contains a fully integrated 26 MHz digitally controlled crystal oscillator, designed for 8 pF crystals. The only external part of the oscillator is the crystal itself. Overall pulling range of the DCXO is approximately ±55 ppm, controllable by a 13-bit tuning word.

This frequency serves as comparison frequency within the RF-PLL and as clock frequency for the digital circuitry. The 26 MHz reference clock can also be applied to external components like Bluetooth or GPS, via the two buffered output signals FSYS1 and FSYS2.

**Figure. 3.5.1 Crystal Oscillator External Connection**

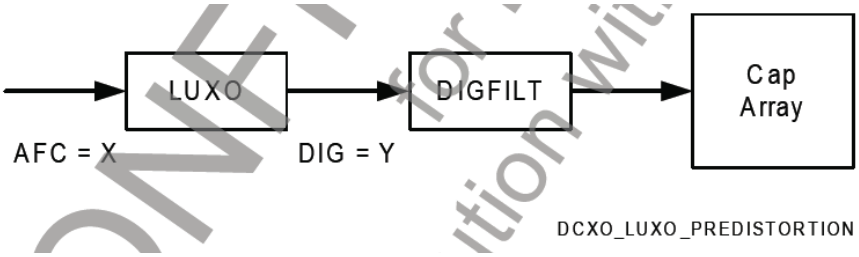



**Figure. 3.5.2 Digital PREDISTORTION with LUXO**

The DCXO tuning characteristic should be a first order linear function of the programming word AFC. The variable capacitance array is a first order linear function of the digital word DIG, which leads to a nonlinear curve ppm vs. DIG (and also a nonlinear ppm vs. AFC for DIG=AFC). In order to linearize the ppm vs. AFC curve the implementation of a predistortion is necessary.
To get the wanted linear ppm vs. AFC tuning curve some digital predistortion of the AFC word is required. This predistortion is performed by the linearization unit for crystal oscillator (LUXO). The LUXO calculates the corresponding DIG value according to the given AFC value.

## 3.6 RF Subsystem of PMB8810 (U101, U401)

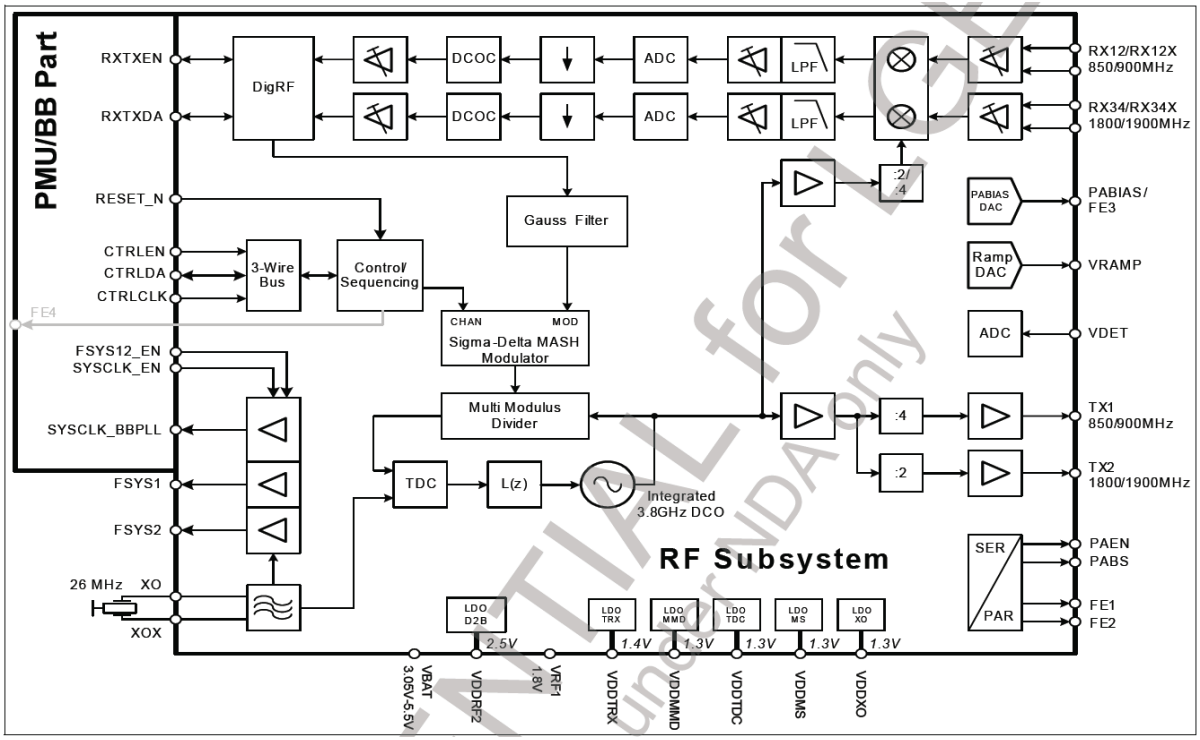



**Figure. 3-6-1 Block DIAGRAM of RF Subsystem**

### 3.6.1 GENERAL DESCRIPTION

The PMB8810 RF subsystem is designed for dual-band GSM voice and data applications (GPRS class 12). The system can be configured to support one low band, GSM850 or EGSM900, and one high band, DCS1800 or PCS1900. A block diagram of the RF subsystem is given in Figure 3-6-1.

## 3.6.2 FUNCTIONAL DESCRIPTION

### 3.6.2.1 Receiver

The X-GOLD™213 dual-band receiver is based on a Direct Conversion Receiver (DCR) architecture. Input impedance of the LNAs is optimized to achieve a matching without (external) high quality inductors. By use of frequency dividers (by 2/4) the LO frequency is derived from the RF frequency synthesizer.
The receive path is fully differential to suppress the on-chip interferences and reduce DC-offsets. The analog chain of the receiver contains two LNAs (low/high band), a quadrature mixer followed by an analog baseband filter and 14-bit continuous-time delta-sigma analog-to-digital converter. The filtered and digitized signal is fed into the digital signal processing chain, which provides decimation, DC offset removal and programmable gain control.

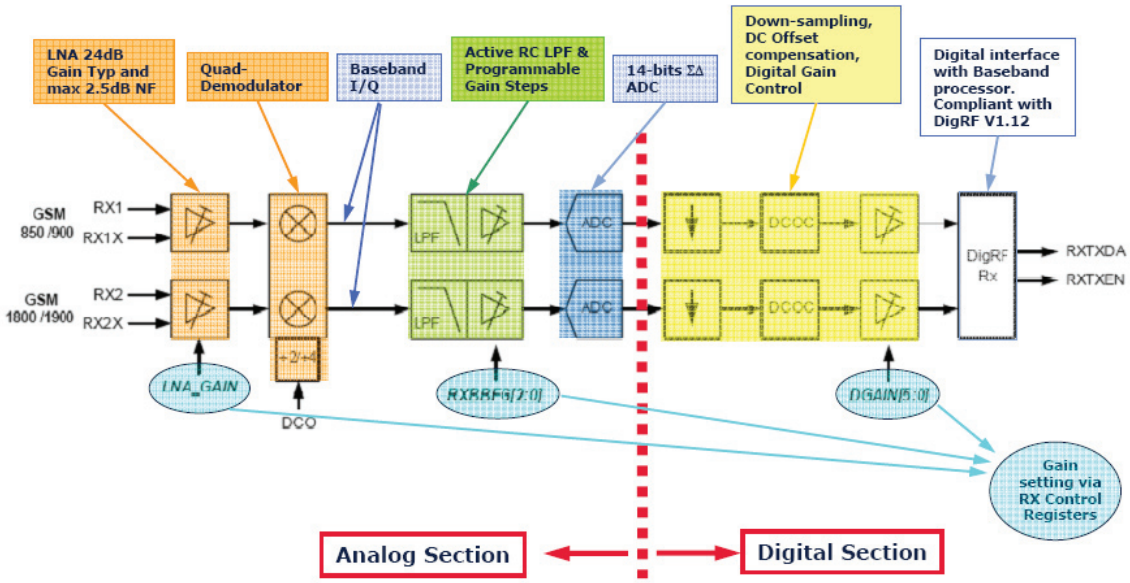



**Figure. 3.6.2 RECEIVER CHAIN BLOCK DIAGRAM**

### 3.6.2.2 Transmitter

The GMSK transmitter supports power class 4 for GSM850 or GSM900 as well as power class 1 for DCS1800 or PCS1900. The digital transmitter architecture is based on a fractional-N sigma-delta synthesizer for constant envelope GMSK modulation. This configuration allows a very low power design without any external components.
Up- and down-ramping is performed via the ramping DAC connected to VRAMP.

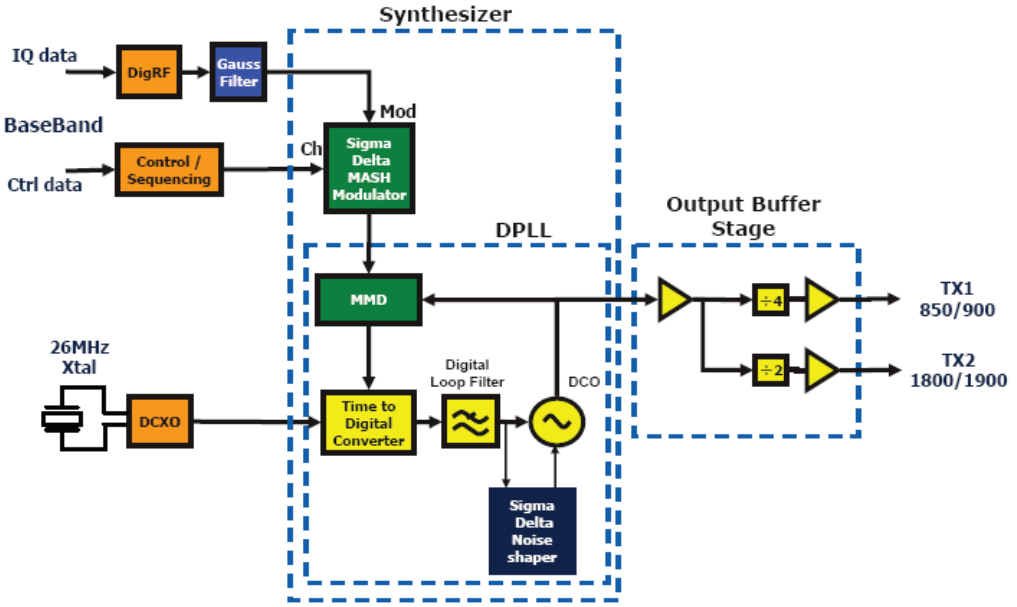



**Figure. 3.6.3 TRANSMITTER CHAIN BLOCK DIAGRAM**

## RF synthesizer

The RF subsystem contains a fractional-N sigma-delta synthesizer for the frequency synthesis. Respective to the chosen band of operation the phase locked loop (PLL) operates at twice or forth of the target signal frequency. In receive operation mode the divided output signal of the digital controlled oscillator output (DCO) serves as local oscillator signal for the balanced mixer. For transmit operation the fractional-N sigma-delta synthesizer is used as modulation loop to process the phase/frequency signal. The 26 MHz reference signal of the phase detector incorporated in the PLL is provided by the reference oscillator.

### 3.6.2.3 Front-end/PA Control Interface

Two outputs (FE1, FE2) for direct control of antenna switch modules enable to select RX- and TX-mode as well as low- and high-band operation.
An extra band select signal PABS for the power amplifier is used, to support discrete PA and switching modules. Time accurate power dissipation of the PA is achieved by the control signal PAEN.
A minor set of power amplifiers require a bias voltage to enhance power efficiency. Support of this power amplifiers is achieved by the implemented bias DAC.

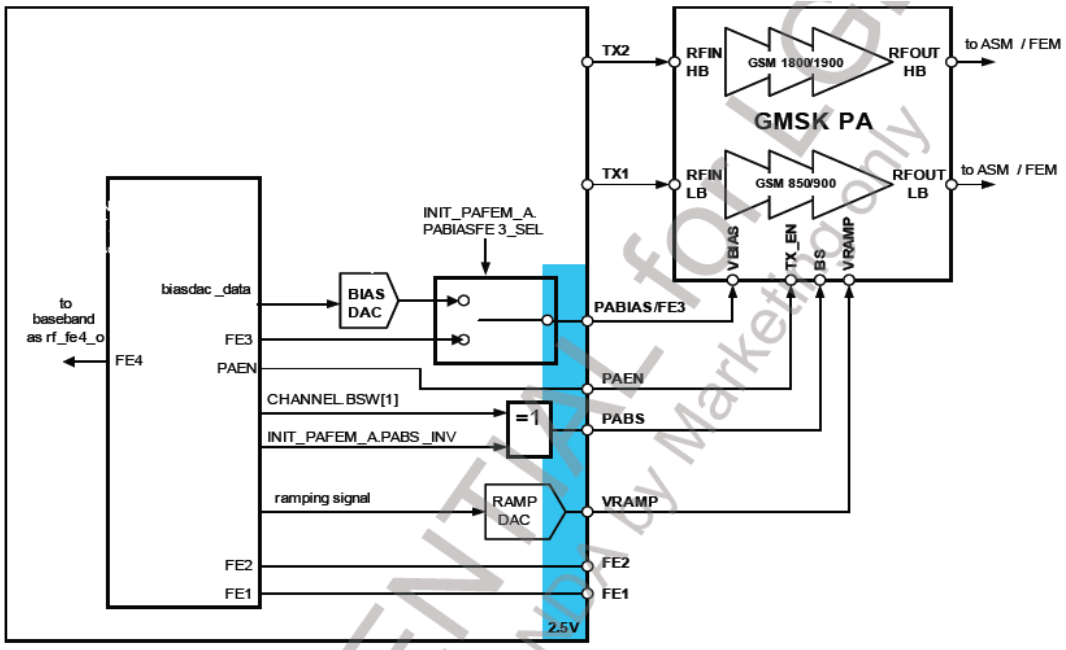



**Figure. 3.6.4 PA AND FEM CONTROL BLOCK DIAGRAM**

### 3.6.2.4 Power Supply

To increase power efficiency most parts of the RF subsystem are supplied by the DCDC converter situated in the PMU subsystem. Conversion of the 1.8 V output voltage of the DCDC to the 1.3 V/1,4 V circuit supply voltages is achieved by several Low-DropOut regulators (LDO).
One embedded direct-to-battery LDO provides the 2.5 V supply voltage for the remaining circuits.

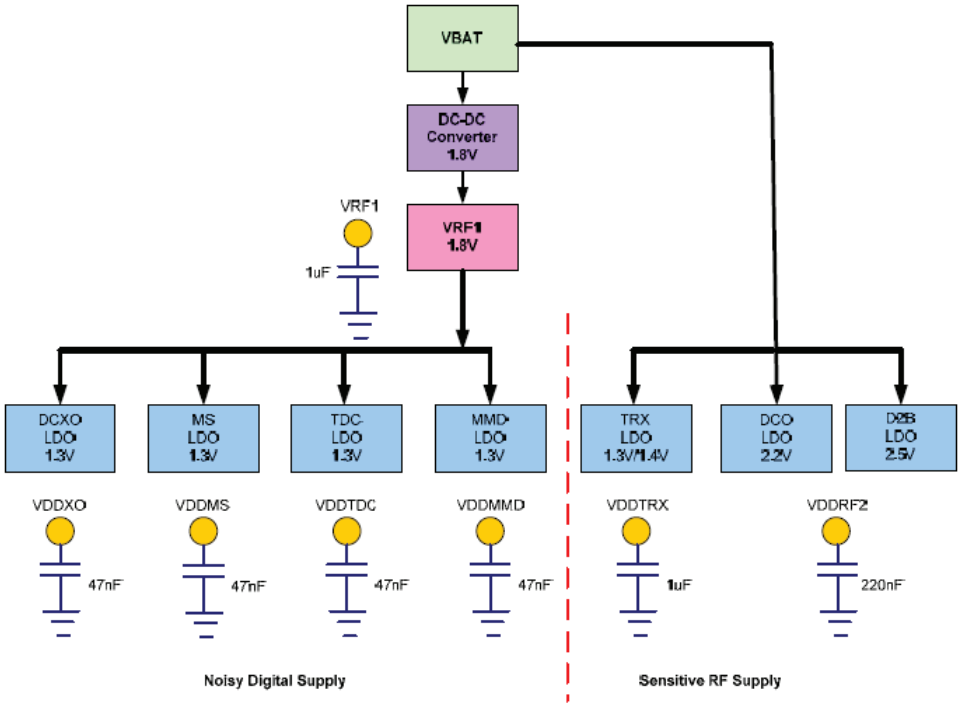



**Figure. 3.6.5 POWER SUPPLY BLOCK DIAGRAM**

## 3.7 MEMORY

LGP520 is composed of 3 memories.
2 Main Memory(NOR+pSRAM) are connected each Main Chip(SIM1 AGR+ / SIM2 AGR+).
and 1 DPRAM is used to communicate between 2 Main Memory(NOR+pSRAM).

### 3.7.1 Main memory (KA8520N00A-BWWW, U100 / S71VS128RC0AHK4L0,U402 )

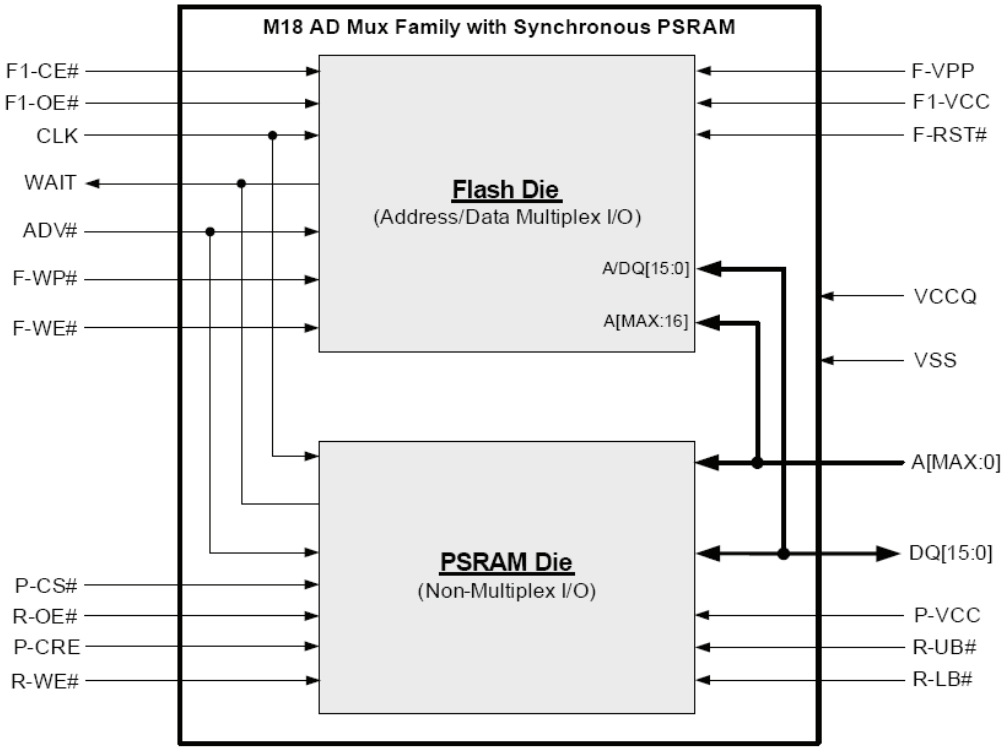



**Figure. 3.7.1 MAIN MEMORY BLOCK DIAGRAM**

The Numonyx™ StrataFlash® Cellular Memory (M18) device provides high read and write performance at low voltage on a 16-bit data bus.

The flash memory device has a multi-partition architecture with read-while-program and read-while-erase capability.

The device supports synchronous burst reads up to 108 MHz using ADV# and CLK address-latching on some litho/density combinations and up to 133 MHz using CLK address-latching only on some litho/density combinations.

It is listed below in the following table.

| Litho (nm) | Density (Mbit) | Supports frequency up to (MHz) | Sync read address-latching |
|---|---|---|---|
| 90 | 256 | 133 | CLK-latching |
| | 512 | 108 | Legacy-latching |
| 65 | 128 | 133 | CLK-latching |
| | 256 | 133 | CLK-latching |
| | 512 | 108 | Legacy-latching |
| | 512 | 133 | CLK-latching |
| | 1024 | 108 | Legacy-latching |
| | 1024 | 133 | CLK-latching |

**Table 3_7_1 M18 Frequency combinations**

In continuous-burst mode, a data Read can traverse partition boundaries.
Upon initial power-up or return from reset, the device defaults to asynchronous arrayread mode. Synchronous burst-mode reads are enabled by programming the Read Configuration Register. In synchronous burst mode, output data is synchronized with a user-supplied clock signal. A WAIT signal provides easy CPU-to-flash memory synchronization.
Designed for low-voltage applications, the device supports read operations with VCC at 1.8 V, and erase and program operations with VPP at 1.8 V or 9.0 V. VCC and VPP can be tied together for a simple, ultra-low power design. In addition to voltage flexibility, a dedicated VPP connection provides complete data protection when VPP is less than VPPLK.
A Status Register provides status and error conditions of erase and program operations.
One-Time-Programmable (OTP) registers allow unique flash device identification that can be used to increase flash content security. Also, the individual block-lock feature provides zero-latency block locking and unlocking to protect against unwanted program or erase of the array.
The flash memory device offers three power savings features:
• Automatic Power Savings (APS) mode: The device automatically enters APS following a read-cycle completion.
• Standby mode: Standby is initiated when the system deselects the device by deasserting CE#.
• Deep Power-Down (DPD) mode: DPD provides the lowest power consumption and is enabled by programming in the Enhanced Configuration Register. DPD is initiatied by asserting the DPD pin.

## 3.7.2 LGP520 SIM1 Part Main Memory (KA8520N00M-BWWW, U100)

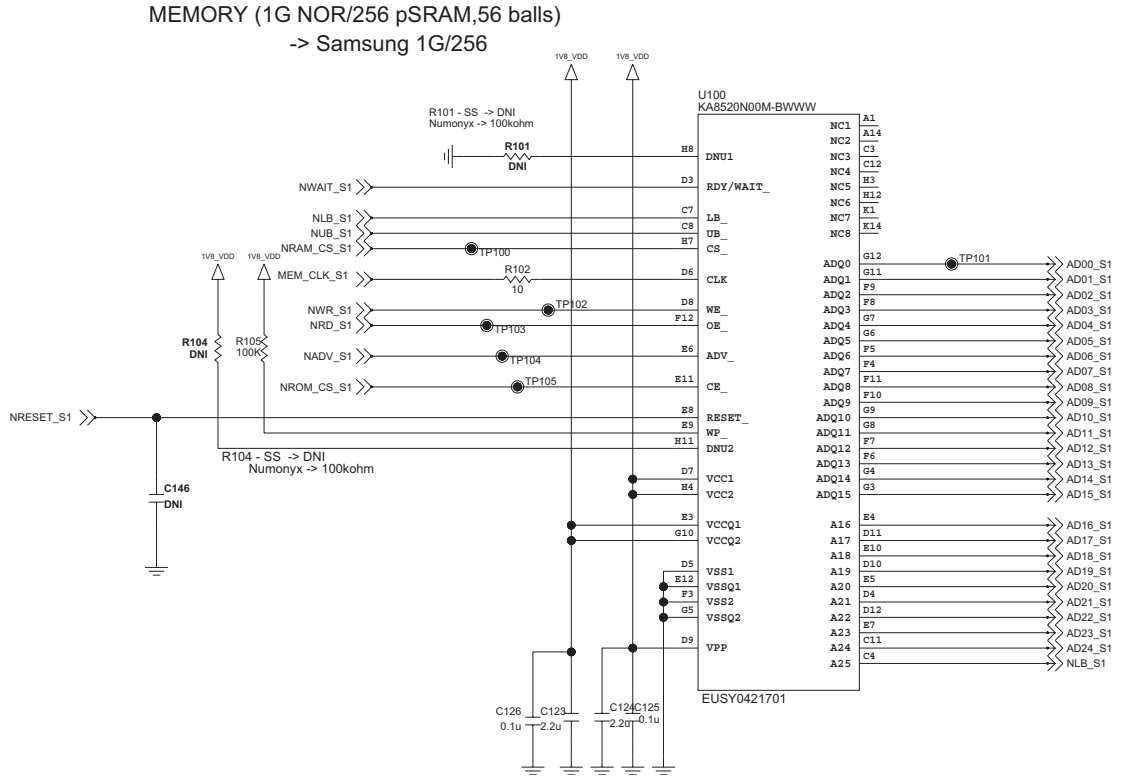



**Figure. 3.7.2 SIM1 Part Memory(NOR+pSRAM) Circuit Diagram**

### 3.7.3 LGP520 SIM2 Part Main Memory (S71VS128RC0ZHK200, U402)

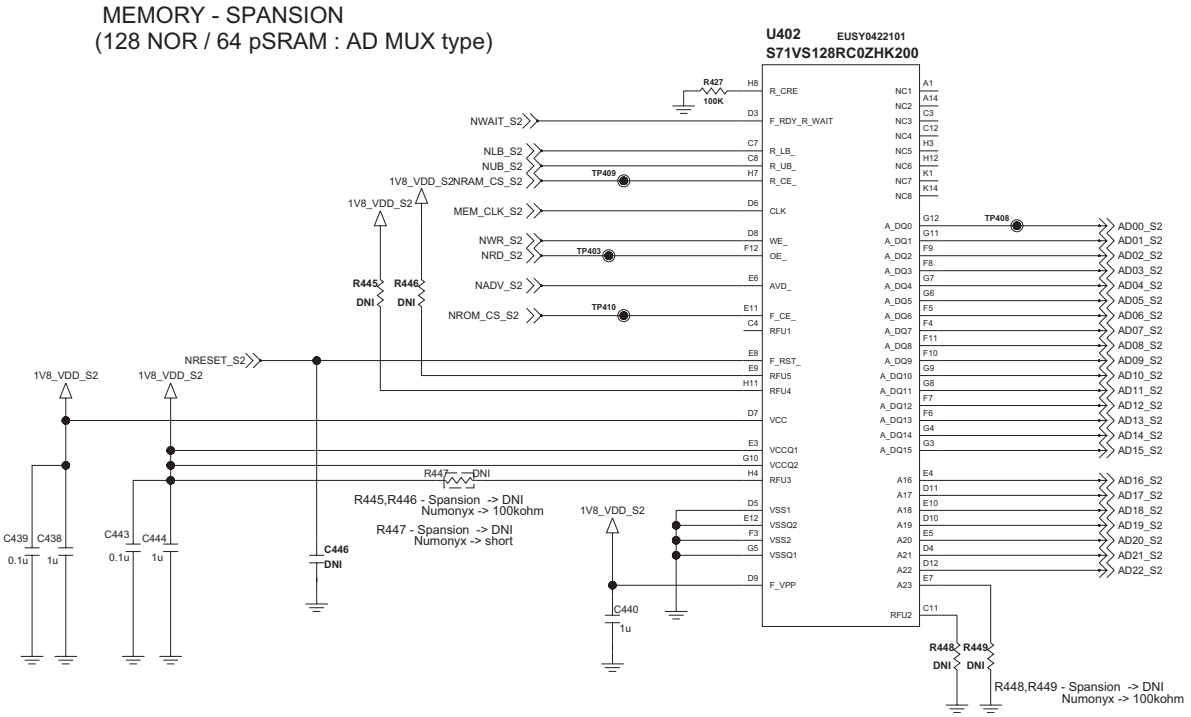



**Figure. 3.7.3 SIM2 Part Main Memory(NOR+pSRAM) Circuit Diagram**

### 3.7.4 Dual Port Memory ( IDT70P255 , U400 )

The IDT70P255 consist of an array of 16k, 8k, and 4k words of 16 dual-ported SRAM cells, IO, address lines, and control signals (CS#, ADV#, OE#, and WE#). Between the two access ports, one is a dedicated time multiplexed address and data interface; the other is a pin selectable port to either standard SRAM or time multiplexed address and data interface. Independent control signals for each port permit simultaneous access to any location in memory. To handle the situation of writing and reading to the same location, a BUSY# pin is provided on each port. For port to port communication, an Interrupt (INT#) pin is also available on each port.

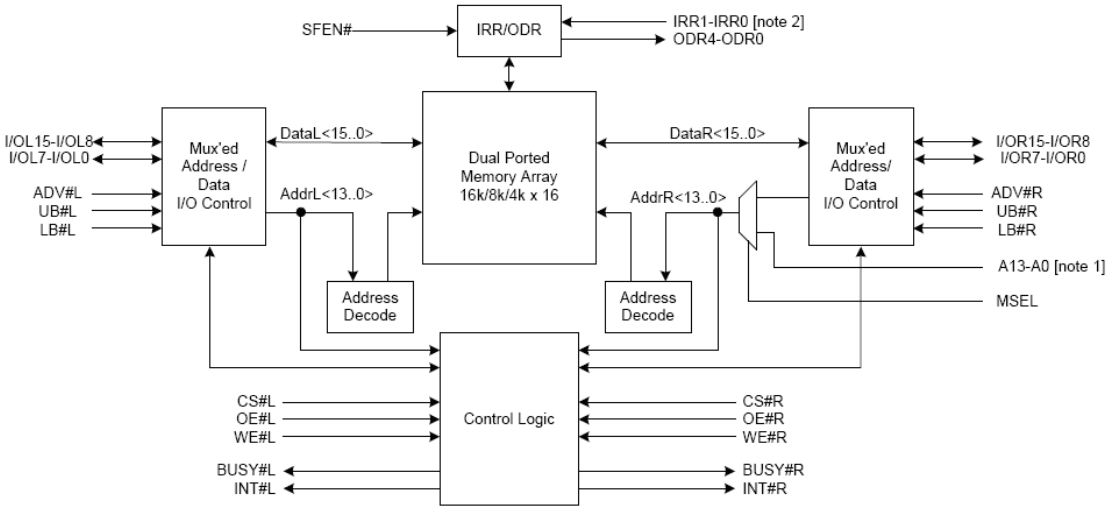



**Figure. 3.7.4 Dual Port MEMORY BLOCK DIAGRAM**

## 3.7.5 LGP520 Dual Port Memory (IDT70P255, U400)

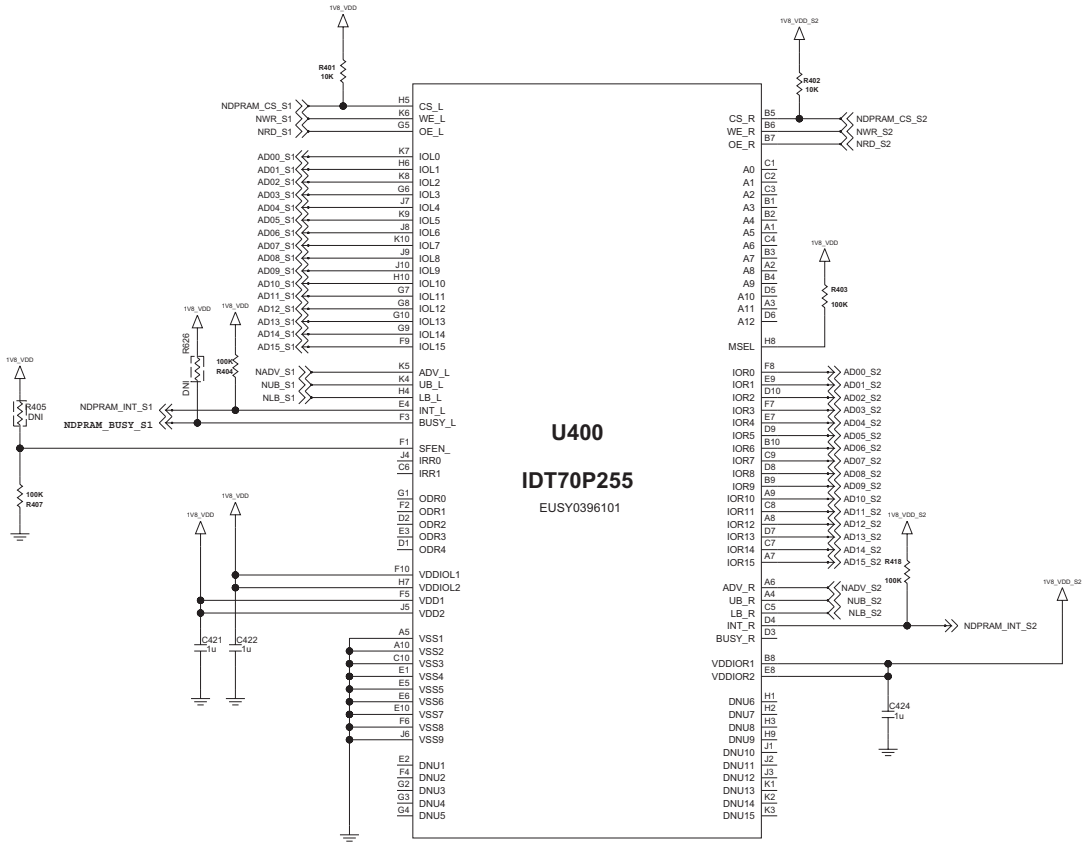



**Figure. 3.7.3 Dual Port Memory Circuit Diagram**

## 3.8 Bluetooth module

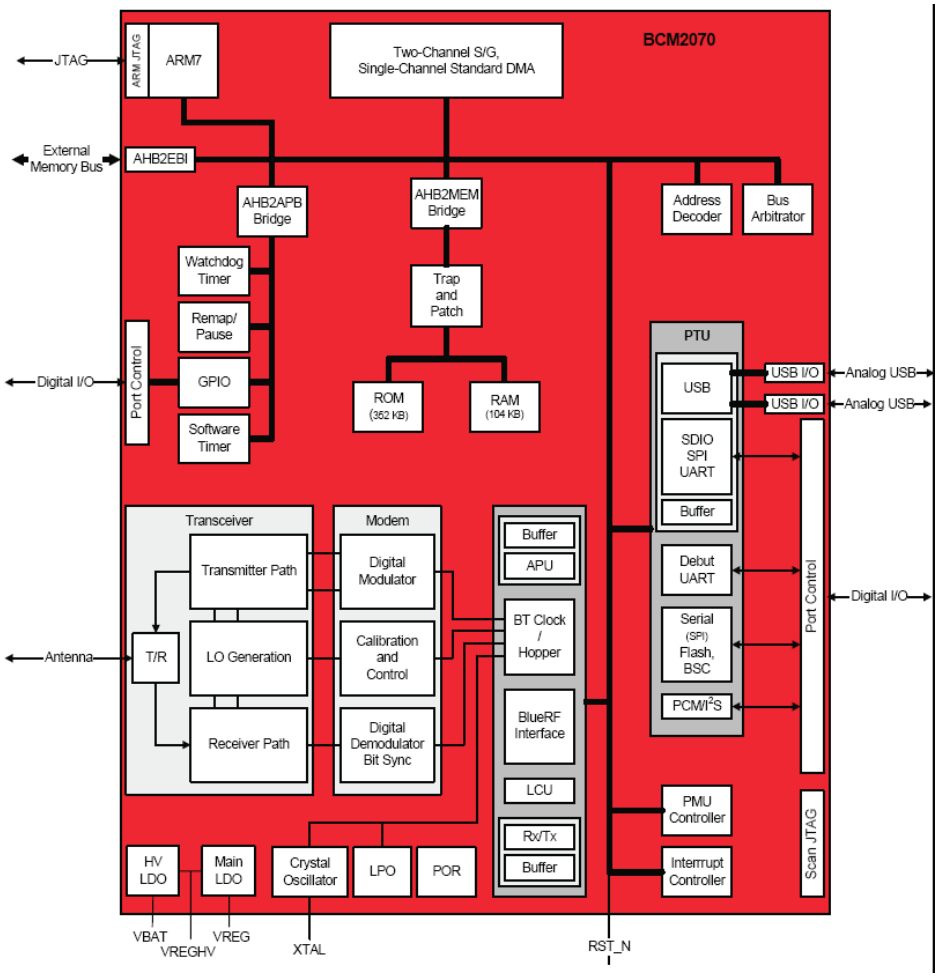



**Figure 3.8.1. Bluetooth BLOCK DIAGRAM**

This module has an integrated radio transceiver that has been optimized for use in 2.4GHz Bluetooth Wireless systems. It has been designed to provide low-power, robust communications for applications Operating in the globally available 2.4GHz unlicensed ISM band. It is fully compliant with the Bluetooth Radio Specification and enhanced data rate specification and meets or exceed the requirement to provide the highest communication link quality of service.

### 3.8.1 Transmitter path

This module features a fully integrated zero IF transmitter. The baseband transmitted data Is digitally modulated in the modem block and up-converted the 2.4GHz ISM band in the Transmitter path. The transmitter path consists of signal filtering, I/Q up-conversion, high-output power amplifier(PA), and RF filtering. It also incorporates modulation schemes P/4-DQPSK for 2 Mbps and 8-DPSK for 3 Mbps to support enhanced data rate.

• **Digital modulator**

The digital modulator performs the data modulation and filtering required for the GFSK, B/4DQPSK, and 8-DPSK signal. The fully digital modulator minimizes any frequency drift or anomalies in the modulation characteristics of the transmitted signal and is much more Stable than direct VCO modulation schemes.

• **Power Amplifier**

The integrated PA for the BCM2070 is configurable for Class 2 operation, transmitting up to +4 dBm as well as Class 1 operation and transmit power up to +12 dBm at the chip, GFSK, >2.5V supply. Due to the linear nature of the PA, combined with some integrated filtering, no External filters are requires for meeting Bluetooth and regulatory harmonic and spurious requirements. For integrated mobile handset applications, where Bluetooth is integrated next to the celluar radio, minimal external filtering can be applied to achieve near thermal noise levels for spurious and radiated noise emissions.
Using a highly linearized, temperature compensated design the PA can transmit +12 dBm for Basic rate and +10 dBm for enhanced data rates(2 to 3 Mbps). A flexible supply voltage range Allows the PA to operate from 1.2V to 3.0V. The minimum supply voltage at VDDTF is 1.8V to achieve +10dBm of transmit power.

### 3.8.2 Receiver path

The receiver path uses a low IF scheme to down-convert the received signal for demodulation in the digital demodulator and bit synchronizer. The receiver path provides a high degree of Linearity, an extended dynamic range, and high order on-chip channel filtering to ensure reliable operation in the noisy 2.4GHz ISM bnad. The front-end topology, with built-in out -of-bnad attenuation, enables the device to be used in most applications with no off-chip Filtering. For integrated handset operation where the Bluetooth function is integrated close to the celluar transmitter, minimal external filtering is required to eliminate the desensitization of The receiver by the cellular transmit signal.

## 3.9 Dual SIM Card Interface

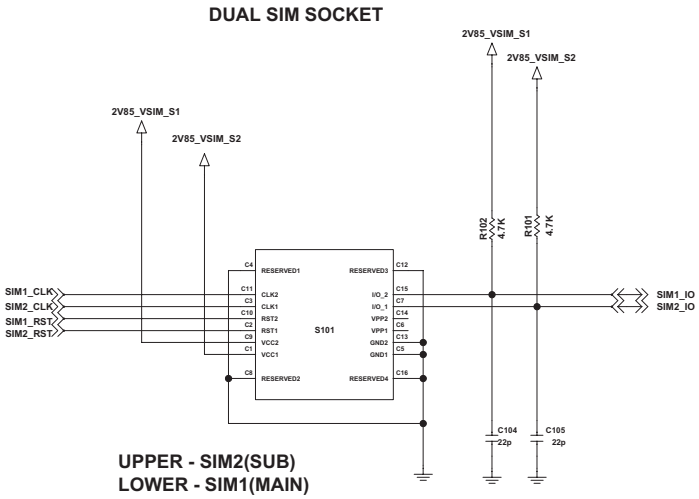



**Figure 3.9.1. Dual SIM CARD Interface**

The Main Base Band Processor(XMM2130) provides SIM Interface Module.
The XMM2130 checks status Periodically During established call mode whether SIM card is inserted or not, but it doesn't check during deep sleep mode. In order to communicate with SIM card, 3 signals SIM_IO, SIM_CLK, SIM_RST.

LGP520 supports dual SIM mode and each SIM supports 3.0V SIM Card.
SIM interface scheme is shown in (Figure 3.9.1).
SIM_IO, SIM_CLK, SIM_RST ports are used to communicate with Main Chip(AGR+)

| Signal | Description |
|---|---|
| SIM_RST | This signal makes SIM card to HW default status. |
| SIM_CLK | SIM card reference clock. |
| SIM1_IO / SIM2_IO | This signal is interface datum. |

## 3.10 LCD Interface

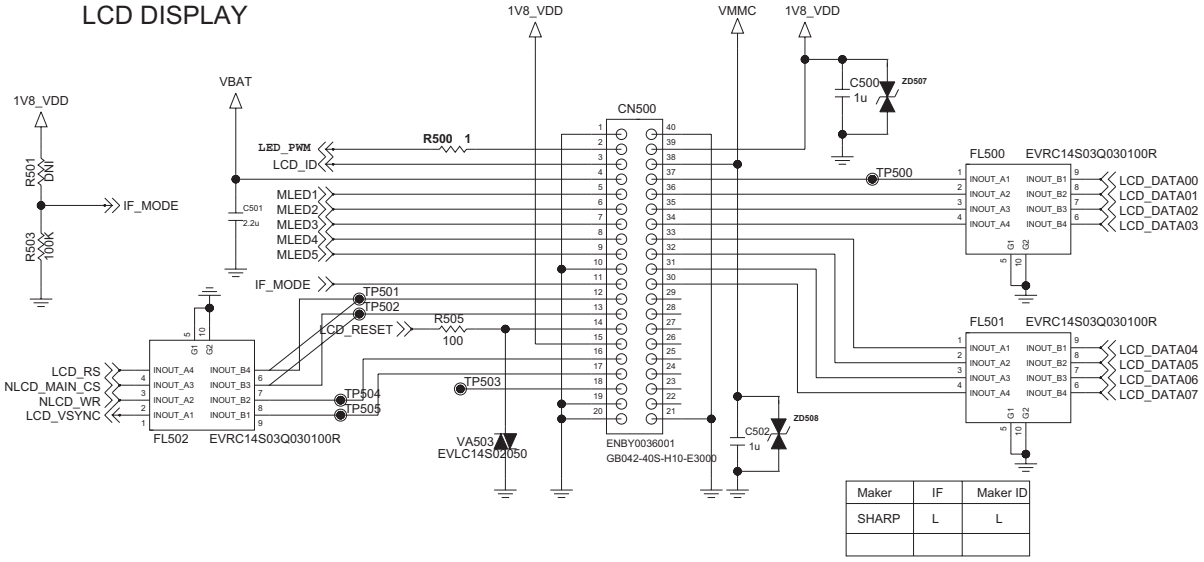



**Figure 3.10.1. LCD Interface**

LGDP4525B is a 262,144-color one-chip SoC driver for a-TFT liquid crystal display with resolution of 320RGBx240dots, comprising a 528-channel source driver, a 220-channel gate driver, 87120 bytes RAM for graphic data of 320RGBx240 dots, and power supply circuit.
LGDP4525B can operate with low I/O interface power supply up to 1.65V, with an incorporated voltage follower circuit to generate voltage levels for driving an LCD.
The LGDP4525B also supports a function to display in 8 colors and a standby mode, allowing for precise power control by software.

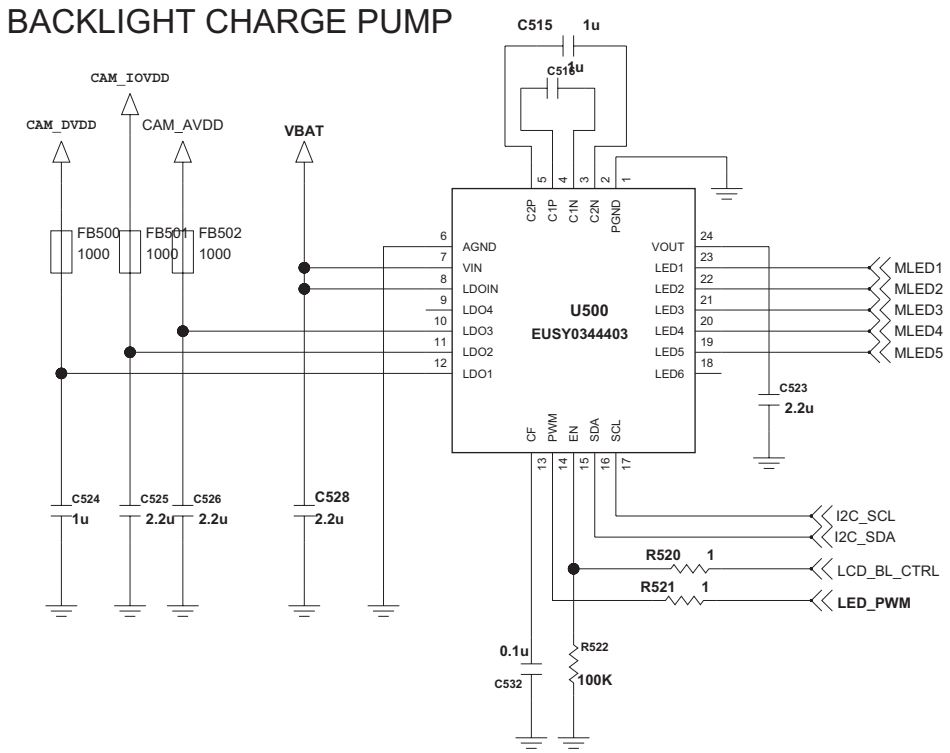



**Figure 3.10.2. RT9396 CIRCUIT DIAGRAM**

The RT9396 is a high efficiency charge pump LED driver using Semtech's proprietary mAhXLifeTM technology. Performance is optimized for use in single-cell Li-ion battery applications.

The charge pump provides backlight current in conjunction with four matched current sinks. The load and supply conditions determine whether the charge pump operates in 1x, 1.5x, or 2x mode. An optional fading feature that gradually adjusts the backlight current is provided to simplify control software. The RT9396 also provides two low- dropout, low-noise linear regulators for powering a camera module or other peripheral circuits.

The RT9396 uses the proprietary SemWireTM single wire interface. The interface controls all functions of the device, including backlight current and two LDO voltage outputs. The single wire implementation minimizes microcontroller and interface pin counts.

In sleep mode, the device reduces quiescent current to 100μA while continuing to monitor the serial interface. The two LDOs can be enabled when the device is in sleep mode. Total current reduces to 0.1μA in shutdown.

**LED Backlight Current Sinks**

The backlight current is set via the SemWire interface. The current is regulated to one of 32 values between 0.5mA and 25mA. The step size varies depending upon the current setting. Between 0.5mA and 12mA, the step size is 0.5mA. The step size increases to 1mA for settings between 12mA and 15mA and 2mA for settings greater than 15mA. This feature allows fi ner adjustment for dimming functions in the low current setting range and coarse adjustment at higher current settings where small current changes are not visibly noticeable in LED brightness.

All backlight current sinks have matched currents, even when there is variation in the forward voltages (∆VF ) of the LEDs. A ∆VF of 1.2V is supported when the input voltage is at 3.0V. Higher ∆VF LED mis-match is supported when VIN is higher than 3.0V. All current sink outputs are compared and the lowest output is used for setting the voltage regulation at the VOUT pin. This is done to ensure that suffi cient bias exists for all LEDs.

The backlight LEDs default to the off state upon powerup. For backlight applications using less than four LEDs, any unused output must be left open and the unused LED driver must remain disabled. When writing to the Backlight Enable Control register, a zero (0) must be written to the corresponding bit of any unused output.

**Backlight Quiescent Current**

The quiescent current required to operate all four backlights is reduced by 1.5mA when backlight current is set to 4.0mA or less. This feature results in higher efficiency under light-load conditions. Further reduction in quiescent current will result from using fewer than four LEDs.

## 3.11 Battery Charger Interface

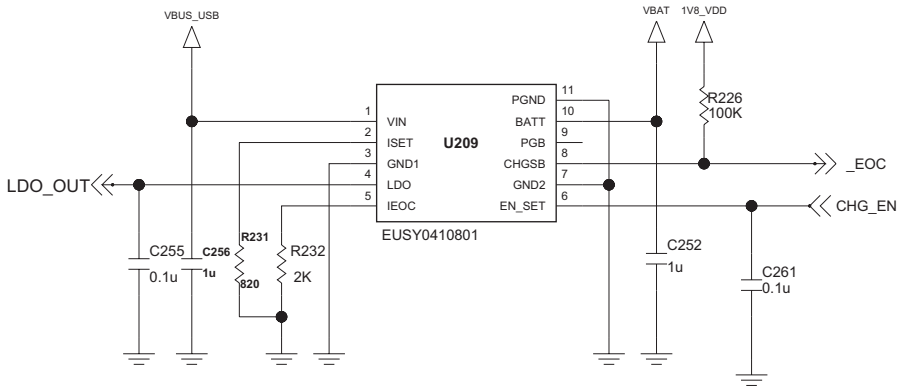



**Figure 3.11.1 BATTERY CHARGER BLOCK**

The RT9524 is an intelligent, stand-alone constant current, constant-voltage (CCCV), thermally regulated dual input linear charger designed for charging a single-cell lithium-ion (Li+) battery.

The IC controls the charging sequence from the prequalification state through constant current fast charge, top-off charge, and full-charge indication.
Proprietary thermal-regulation circuitry limits the die temperature during fast charging or when the IC is exposed to high ambient temperatures, allowing maximum charging current without damaging the IC.

The RT9524 accepts input supply range from -0.3V to 28V, but disables charging if the input voltages exceed +6.9V to protect against unqualified or faulty AC adapters cables. The IC operates over the extended temperature range (-40˚C to +85˚C)

## 3.12 Keypad Interface

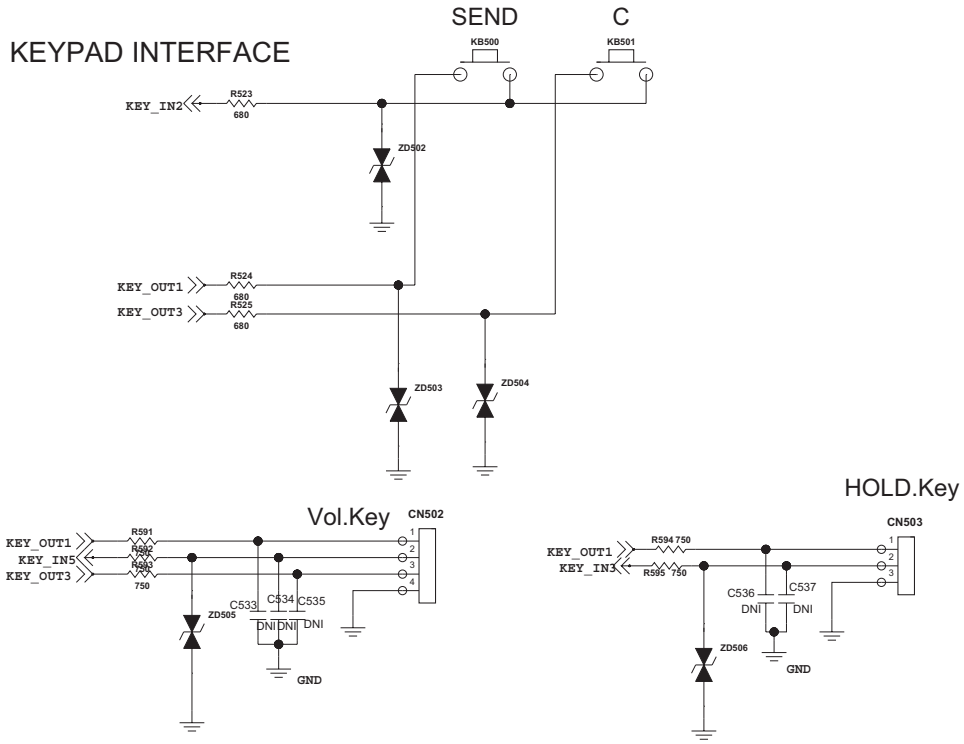



**Figure 3.12.1 MAIN KEY STRUCTURE**

The Keypad Interface is a peripheral controller, which can be used for scanning external keypad matrices with up to 8 rows and 8 columns (that is 64 standard keys). By adding an additional row of keys connected to ground the number of keys can be extended by up to 8 keys. This results in a maximum number of 72 keys to by identified by the Keypad Interface Controller.
The Keypad Scan Module reduces the number of interrupts and polling through the processor and therefore reduces the power consumption. The module is able to debounce and scan the external keypad matrix automatically without any software intervention. After debouncing it generates an interrupt. The interface controller contains information about the key (or key combination) that was pressed and how long it was pressed.

## 3.13 Audio Front-End

### 3.13.1 Functional Overview

The audio front-end of X-GOLD™213 offers the digital and analog circuit blocks for both receive and transmit audio operation, from a mobile phone perspective (called audio-in and audio-out subsequently). It features a high-quality, stereo digital-to-analog path with amplifier stages for connecting acoustic transducers to X-GOLD™213. In audio-in path the supply voltage generation for electret microphones, a low-noise amplifier and analog to digital conversion are integrated in X-GOLD™213. A more detailed functional description will be given in the following sections.

The audio front-end itself can be considered to be organized in three sub-blocks:
• Interface to processor cores (TEAKLite® and - indirectly - ARM)
• Digital filters
• Analog part

The following figure shows an architecture overview of the Audio section.

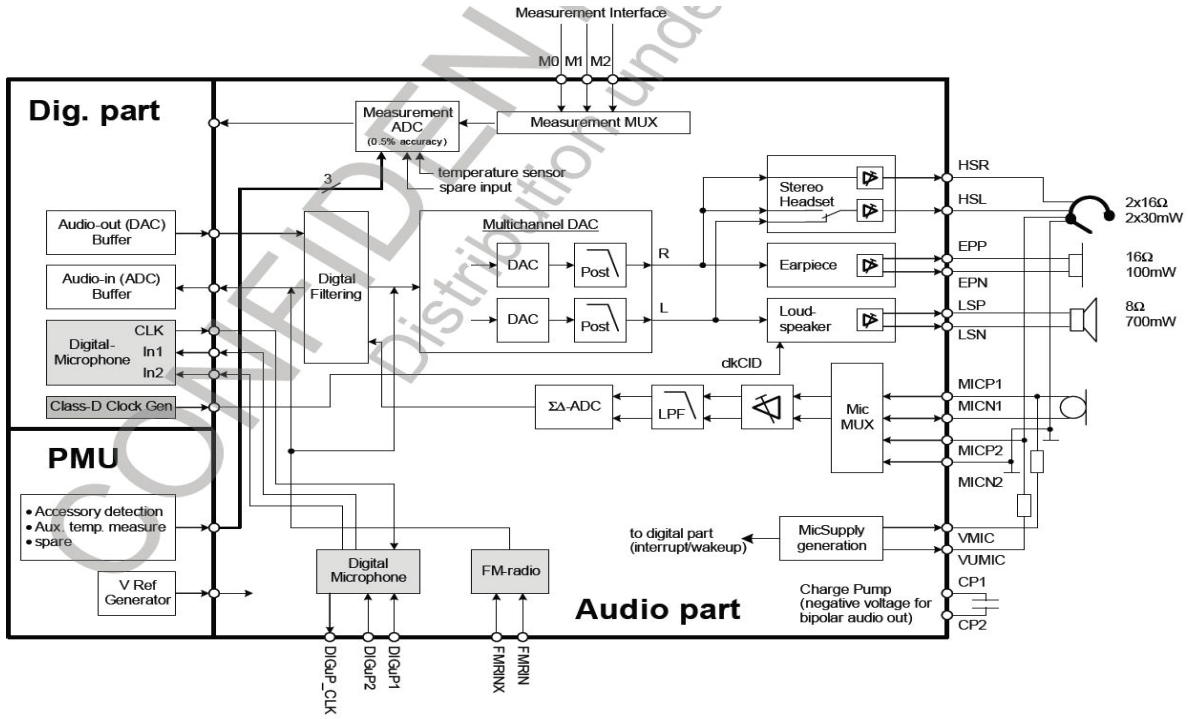



**Figure 3.13.1 Audio Section Overview**

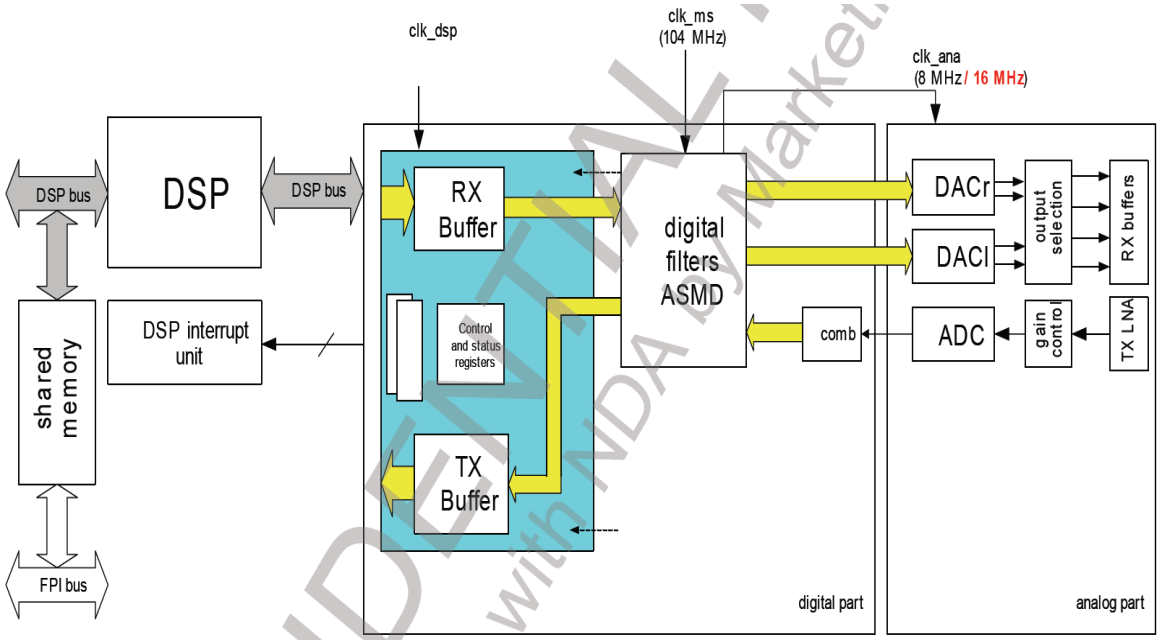



**Figure 3.13.2 Overview of Clocking and Interfaces of Audio Front End**

**The audio front-end of X-GOLD™213 has the following major operation modes:**
• Power-down: All analog parts are in power down and all clocks of the digital part are switched off.
• Audio mode: Digital decimation/interpolation filters are connected to the interface buffers and the analog part is enabled.

**These major modes can be modified by certain control register settings.**
• Due to the new gain settings in the TX path, the maximum input voltage is limited to 0.8 Vpp.
• In both voiceband paths, the value range for voice samples is confined to 97.5%, i.e. to [-31948, 31947] or [8334H, 7CCBH] in X-GOLD™213.
• On the TX path, 83% "1"s on the VTPDM line correspond to a 16-bit value of 7CCBH and 17% "1"s correspond to a 16-bit value of 8334H at the digital filter output. Thus the usable range is 66%. This range can be scaled to 100% by Firmware.
• The high-pass functions of the voiceband filters have to be implemented in firmware on TEAKLite®.

### 3.13.2 Digital Part

The digital part of the X-GOLD™213 audio front-end comprises an interface to the TEAKLite® bus, interfaces to the interrupt units of TEAKLite®, digital interpolation filters for oversampling digital-to-analog conversion, digital decimation filters for analog-to-digital conversion and an interface to the analog part of the audio front-end. For the digital microphone all the filtering is done in a dedicated hardware. The output sample stream is then fed in a duplicated ring buffer structure like the data from the analog microphone path (after A/D conversion and subsequent digital filtering).

**▪ Interpolation Filter**

The interpolation path of the X-GOLD™213 audio front-end increases the sampling rate of the audio samples to the rate of the digital-to-analog converter. Because the input sampling rates can vary between 8 kHz and 47.619 kHz the filter characteristic and oversampling ratio can be adjusted to the respective sampling rate. The requirements for the interpolation filters depend on the sampling rate, because a sufficient out-of-band discrimination in the audio frequency band (20 Hz,...,20 kHz) has to be ensured.

**▪ Decimation Filter**

The digital decimation filter on X-GOLD™213 has two operating modes: 8 kHz output sampling rate and 16 kHz output sampling rate (or 16 kHz output sample rate and 16kHz bandwidth in case of doubled ASMD clock).

### 3.13.3 Analog Part

The analog part of the X-GOLD™213 audio front-end in audio-out direction consists of a stereo digital to analog converter (multi-bit oversampling converter) which transforms the output of the digital interpolation filter into analog signals. It is followed by the gain control/amplifier section. The DAC outputs can be switched to several output buffers. In audio-in section there is an input multiplexer which selects either one of two differential microphone inputs to be connected to the low-noise amplifier and analog pre-filter. The signals from the analog pre-filter are input to a second-order sigma-delta analog-to-digital converter. In addition there is a connection for FM-radio playing.

**▪ Audio-out Part**

The analog audio-out part consists of two multi-bit digital-to-analogue converters (DAC) and an output stage. The signal sources are switched to the output drivers in the output stage. The output drivers consist of: a) one mono, differential class-D Loudspeaker driver, b) one mono, differential Earpiece driver and c) one stereo, single-ended (with uni- or bipolar signals), Headset driver.

▪ **Digital-to-analog converters**

The multi-bit oversampling DACs of the X-GOLD™213 audio front-end convert the 16-bit data words coming from the digital interpolation filters to analogue signals.

▪ **Output Amplifier**

The different output buffers in X-GOLD™213 are driven by the outputs of the selection block. The differential earpiece driver can be used to drive a 16 Ω earpiece and works in differential. The two single ended headset drivers can be used to drive a 16 Ω headset. They can work unipolar mode, where an AC coupling of the headset might be needed, or can work also in bipolor mode. The differential loudspeaker driver can be used to drive a 8 Ω loudspeaker. As it is a class-D amplifier the needed suppression of the higher harmonics of the switching signals
has to be achieved by the external circuitry. The buffers are designed to be short circuit protected.

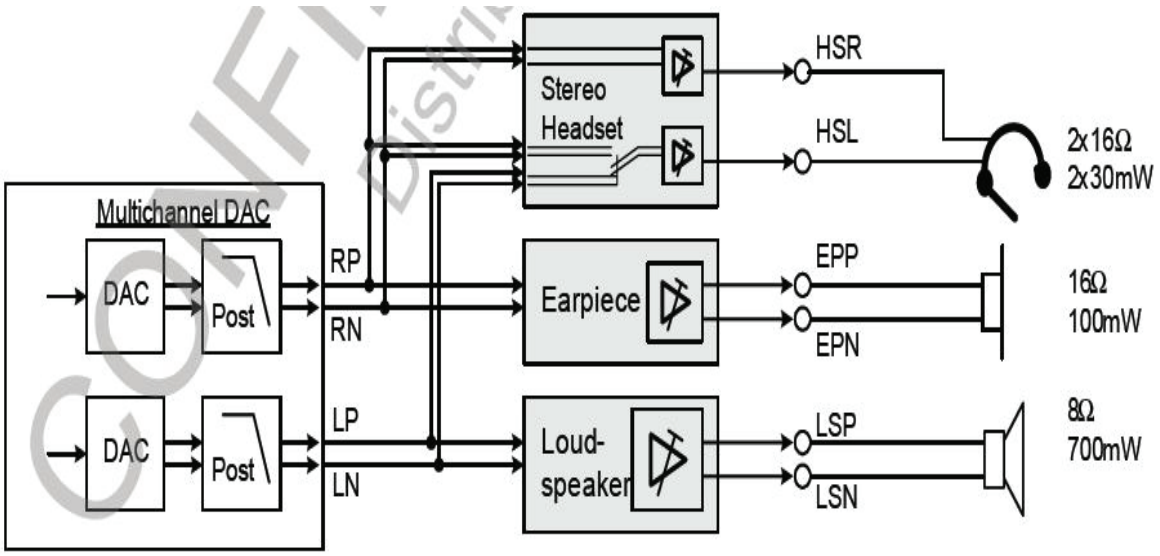



**Figure 3.13.3 Switching for R/L DACs onto Buffers**

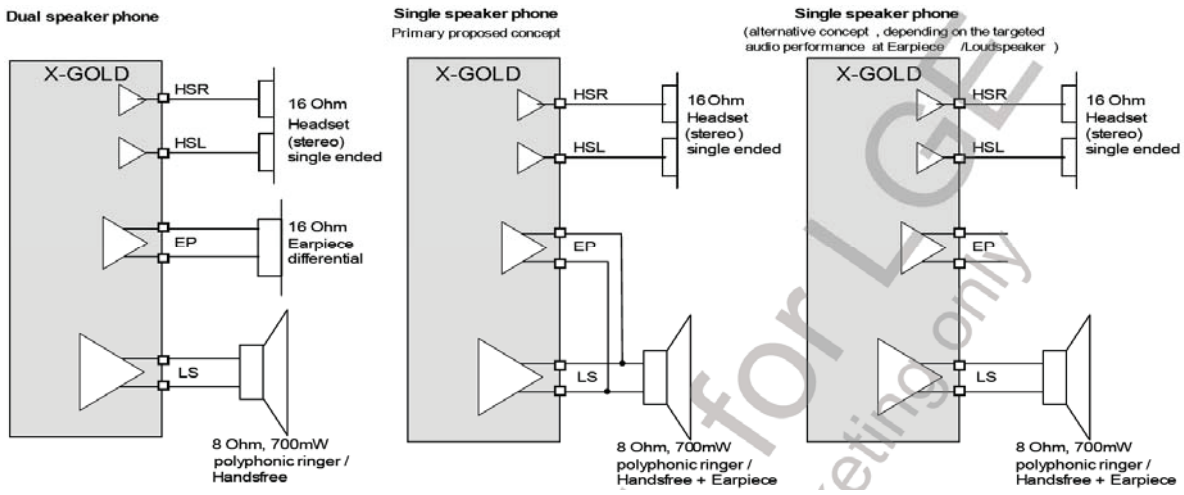



**Figure 3.13.4 Different Application Scenarios**

In order to achieve the single-speaker concept by parallel connection of Earpiece and Headset amplifier the Earpiece amplifier have to sustain the up to 5 V voltage of the class-D amplifier.

**▪ Audio-in Path**

The audio-in path of X-GOLD™213 provides two differential microphone input sources, MIC1and MIC2.

• The inputs for microphone MIC1 are MICP1 and MICN1.
• The inputs for microphone MIC2 are MICP2 and MICN2.

The audio-in path consists of an input selector, a low noise amplifier and following pre-filter with gain control, a second order ΣΔ-converter and a digital decimation filter. It supports both standard GSM (bandwidth 3.5 kHz) and wideband (bandwidth 7 kHz) speech bands.
The differential input signal from the microphone first passes a low noise amplifier and following pre-filter and an anti-aliasing pre-filtering stage achieving and overall variable gain ranging from 0 dB to +39 dB . The signal is then modulated by a second order ΣΔ-converter which is clocked with the same clock rate as the digital to analog converters. The ΣΔ-converter delivers a 1-bit pulse density modulated data stream at a rate of 2 MHz to the digital decimation filter which reduces the rate to 8 kHz or 16 kHz, depending on the current mode.
To improve SNR the sample frequency can be doubled in dedicated modes and the modulated data stream is 4MHz instead of 2 MHz.

**▪ Microphone Supply**

X-GOLD™213 has a single ended power-supply concept for electret microphones:
For both modes a minimal load capacitance of t.b.d. nF is necessary to guarantee stable operation of the buffer.
The maximal load capacitance must not exceed t.b.d. nF.
2 microphone supplies VMIC and VUMIC are available. The supply VUMIC has a ultra-low-power mode, where the current consumption is minimum, whilst at the same time the noise performance is reduced. For this purpose the VUMIC is directly supplied out of the VMIC regulator, the Mic-Buffer can be switched off and only the quiescent current of the VMIC regulator is present. This mode can be used to supply a headset and allow accessory detection with highly reduced current consumption For normal operation the supply can be switched to normal operation mode with improved noise performance. In case of an digital microphone VMIC can be used for supplying this microphone.

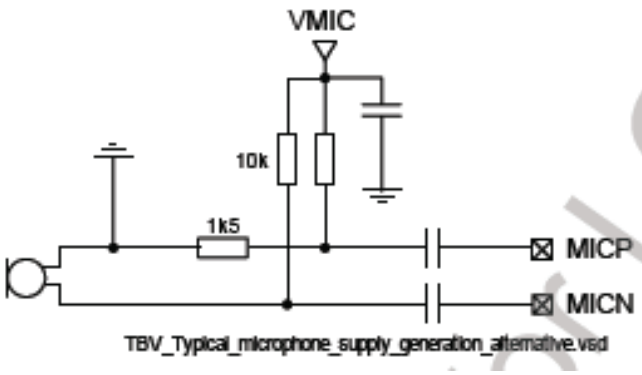



**Figure 3.13.5 Typical Microphone Supply Generation (alternative)**

## 3.14 Camera Interface(1.3M Fixed Focus Camera)

### 3.14.1 PMB8810 Camera Interface

The Camera Interface (CIF) represents a complete video and still picture input interface (see Figure 26).

The CIF contains image processing, scaling, and compression functions. The integrated image processing unit supports image sensors with integrated $YC_bC_r$ processing.
Scaling is used for downsizing the sensor data for either displaying them on the LCD, or for generating data streams for MPEG-4 compression. In general, $YC_bC_r$ 4:2:2 JPEG compressed images should use the full sensor resolution, but they can also be downscaled to a lower resolution for smaller JPEG files. Scaling also can be used for digital zoom effects, because the scalers are capable of up-scaling as well.
CIF All data is transmitted via the memory interface to an AHB bus system using a bus master interface. Programming is done by register read/write transactions using an AHB slave interface.

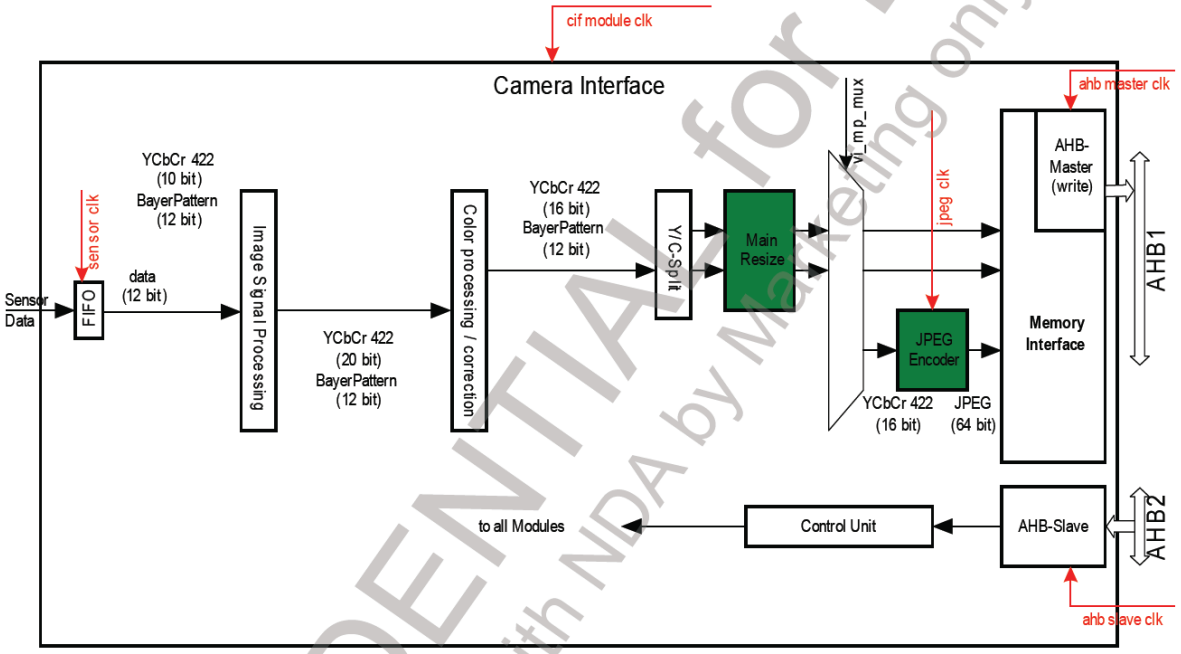



**Figure 3.14.1 Block Diagram of Camera Interface**

**Functional Overview of CIF**

The following list gives an overview over the CIF's functionality:

- 78 MHz system clock
- 78 MHz sensor clock
- 78 MHz JPEG encoder clock
- 32-bit AHB slave programming interface
- ITU-R BT 601 compliant video interface supporting $YC_bC_r$
- ITU-R BT 656 compliant video interface supporting $YC_bC_r$ data
- 8-bit camera interface
- 12-bit resolution per color component internally
- $YC_bC_r$ 4:2:2 processing
- Hardware JPEG encoder incl. JFIF1.02 stream generator and programmable quantization and Huffman tables
- Windowing and frame synchronization
- Continuous resize support
- Frame skip support for video (e.g. MPEG-4) encoding
- Macro block line, frame end, capture error, data loss interrupts and sync. (h_start, v_start) interrupts
- Programmable polarity for synchronization signals
- Luminance/chrominance and chrominance blue/red swapping for YUV input signals
- Maximum input resolution of 3 Mpixels (2048x1536 pixels)
- Main scaler with pixel-accurate up- and down-scaling to any resolution between 3 MP (2048x1536) and 32x16
- pixel in processing mode
- Buffer in system memory organized as ring-buffer
- Buffer overflow protection for raw data and JPEG files
- Asynchronous reset input, software reset for the entire IP and separate software resets for all sub-modules
- Interconnect test support
- Semi planar storage format
- Color processing (contrast, saturation, brightness, hue)
- Power management by software controlled clock disabling of currently not needed sub-modules

## 3.15 Vibrator Interface

Support PWM signal which generated by hardware itself via register control
Direct connect to the VIB and VSSVIB pin from XMM2130 without any external component required
It is capable to driver the vibrator motor up to 150mA

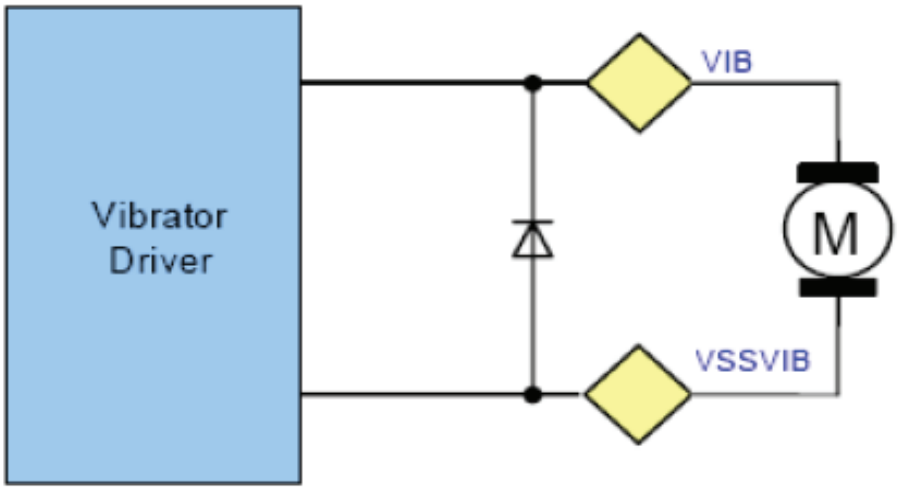



**Figure 3.15.1 Vibrator Driver Block Diagram**

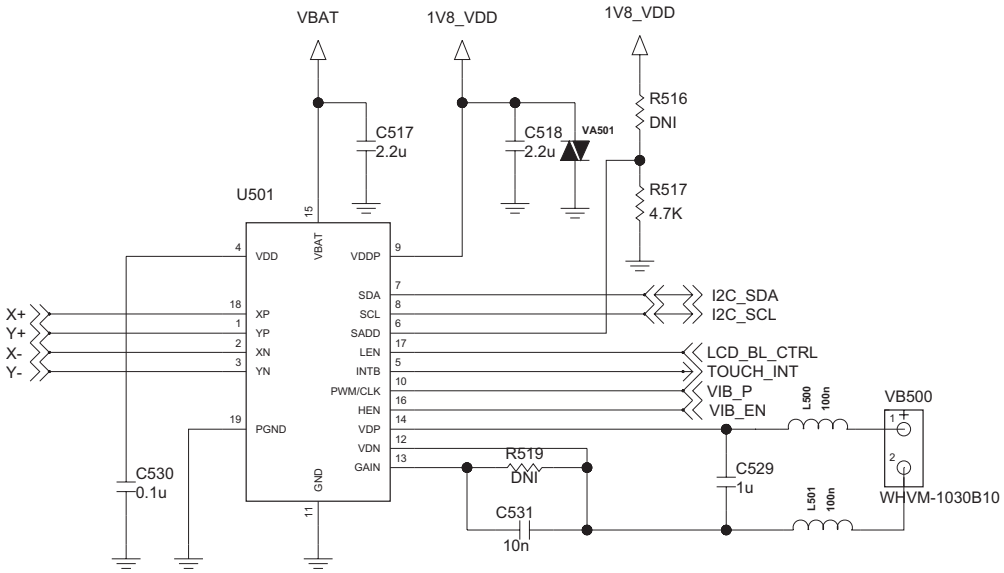



**Figure 3.15.2 Vibrator Driver Block**

# 4. TROUBLE SHOOTING

## 4.1 Trouble shooting test setup

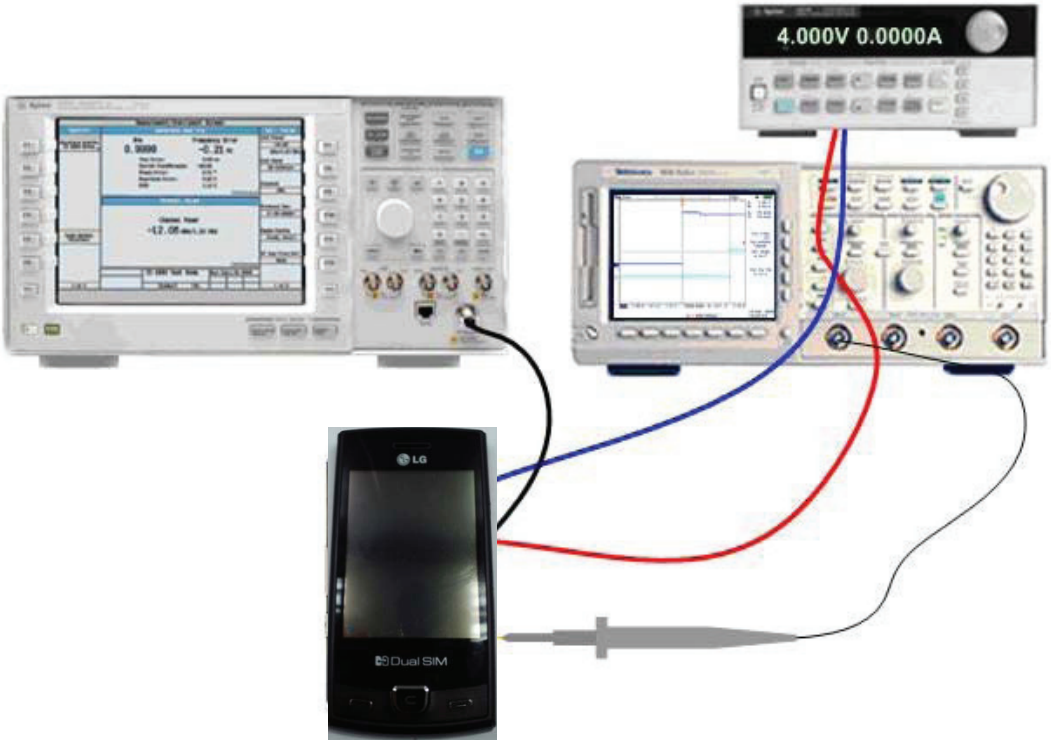



**Figure 4.1.1 Equipment setup**

**Power on all of test equipment**

- Connect PIF-UNION JIG or dummy battery to the DUT for power up.
- Connect mobile switch cable between Communication test set and DUT when you need to make a phone call.
- Follow trouble shooting procedure

## 4.2 RF Component

### 4.2.1 SIM 1 (main)

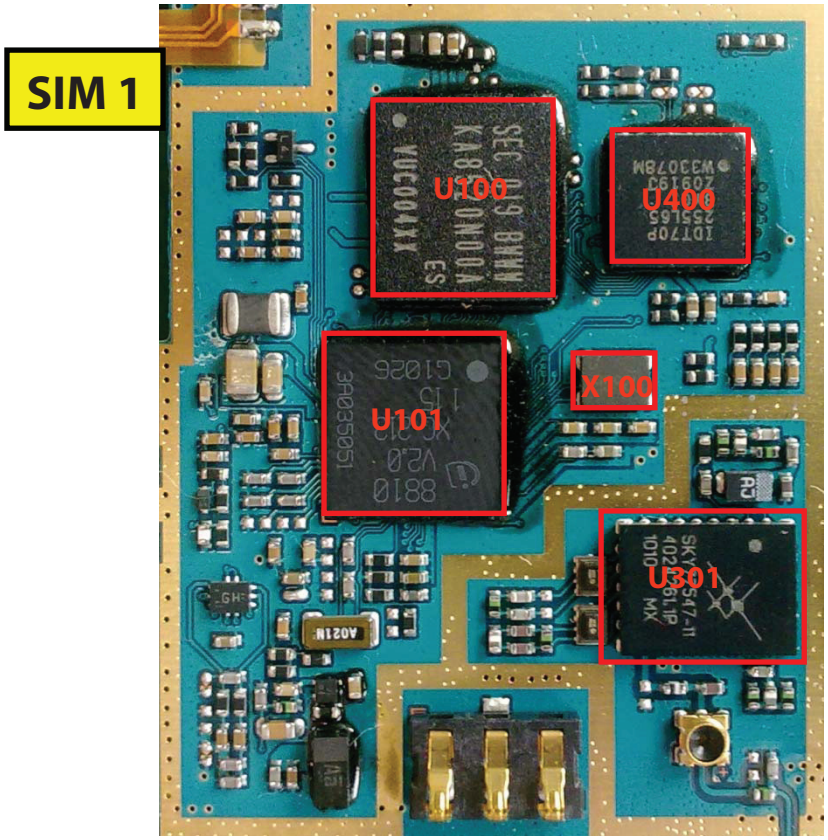



**Figure 4.2.1 SIM 1 (main) block**

| | |
|---|---|
| U100 | MEMORY (1G NOR/256 pSRAM,56 balls)<br>KA8520N00M |
| U101 (PMB8810) | Main Chip (A-GOLDRADIO+) |
| U301 | FEM(Tx Module) |
| X400 | Crystal, 26MHz Clock |
| U400 | DPRAM |

### 4.2.2 SIM 2 (sub)

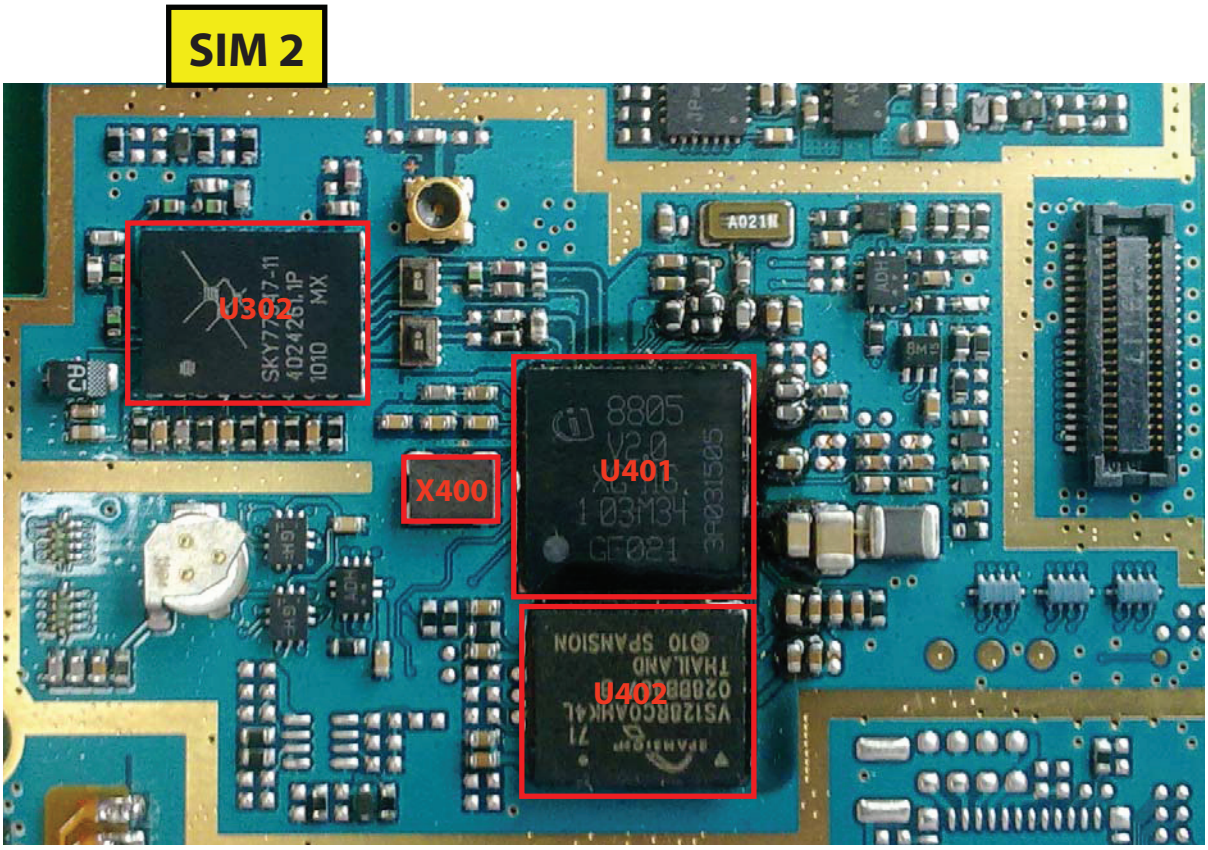
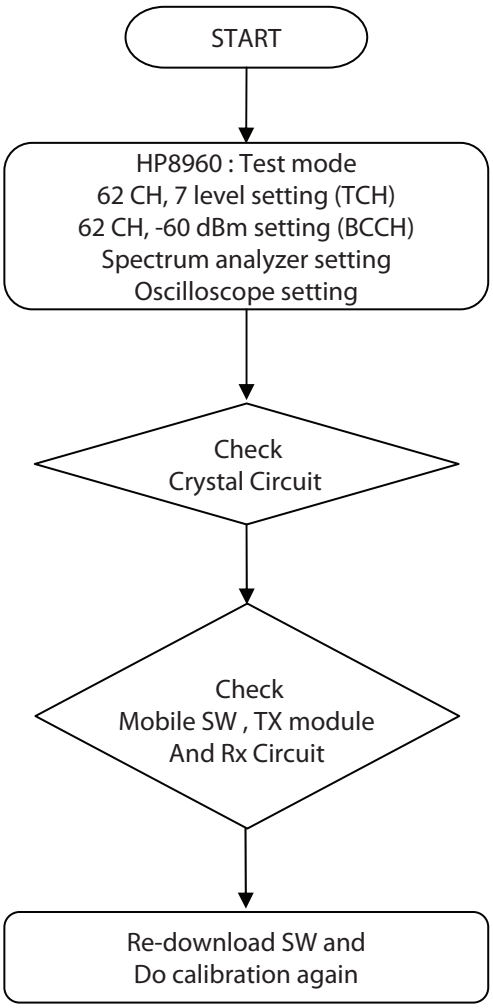



**Figure 4.2.2 SIM 2 (sub) block**

| | |
|---|---|
| U402 | Memory(128 NOR / 64 pSRAM)<br>S71VS128RC0ZHK200 |
| U401 (PMB8805) | Sub Chip (A-GOLDRADIO) |
| U302 | FEM(Tx Module) |
| X400 | Crystal, 26MHz Clock |

## 4.3 RX Trouble

CHECKING FLOW



### 4.3.1 Checking Crystal Circuit

TEST POINT

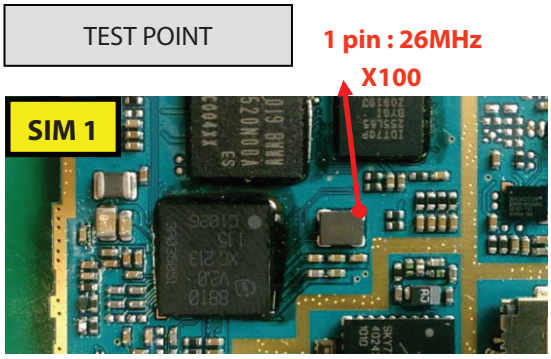



Figure 4.3.1 SIM 1 (main) crystal

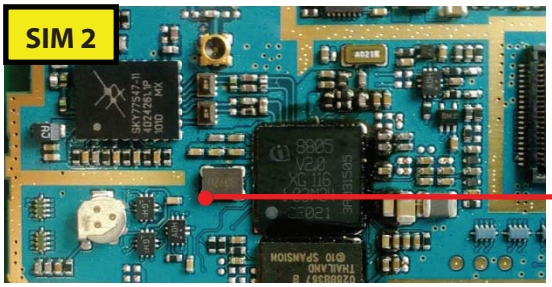
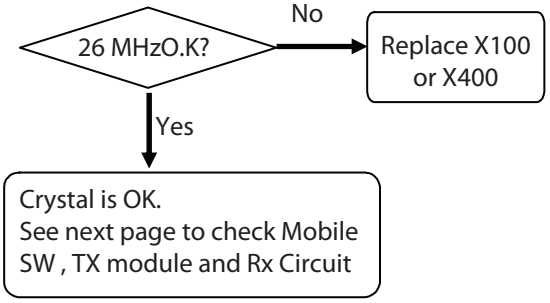



Figure 4.3.2 SIM 2 (sub) crystal

CHECKING FLOW




CIRCUIT

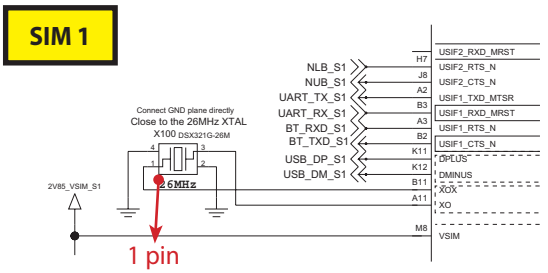



Figure 4.3.3 SIM 1 crystal circuit

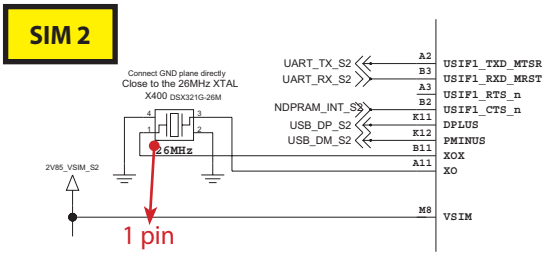



Figure 4.3.4 SIM 2 crystal circuit

WAVEFORM

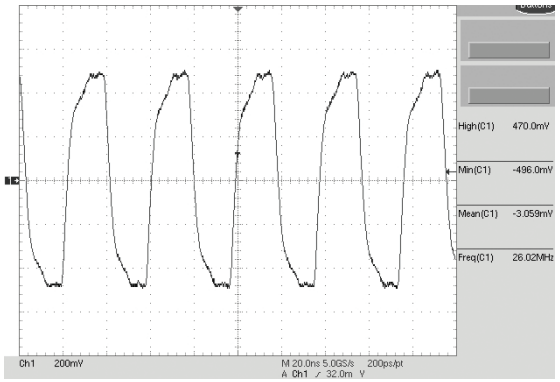



Figure 4.3.5 26MHz output waveform

### 4.3.2 Checking Mobile SW & FEM

TEST POINT

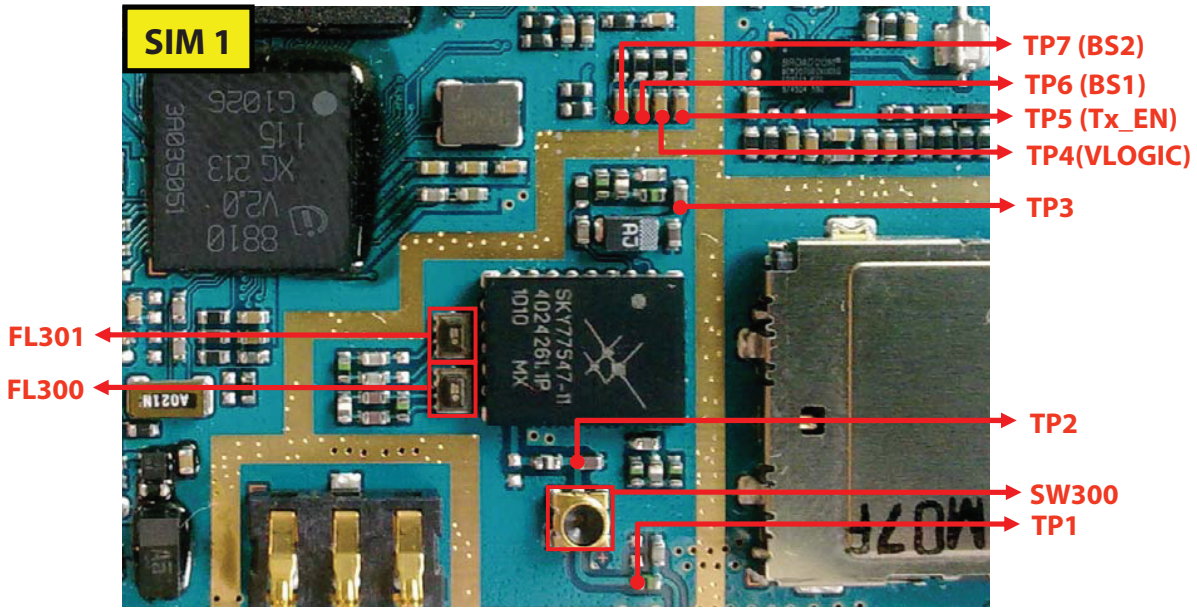



**Figure 4.3.6 SIM 1 Mobile SW & FEM**

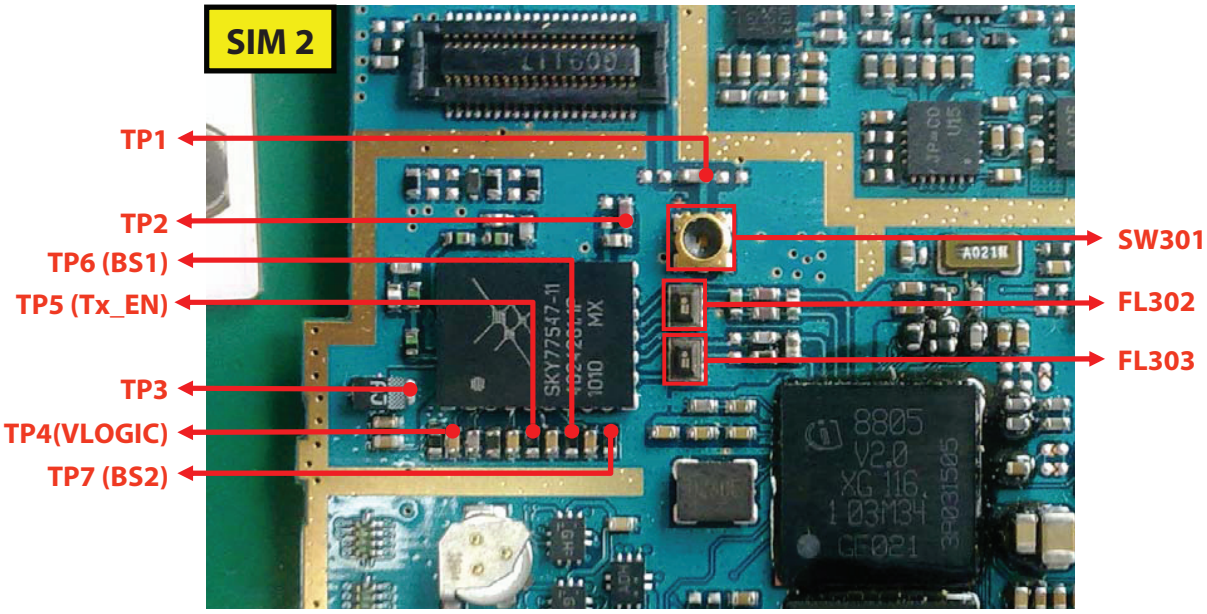



**Figure 4.3.7 SIM 2 Mobile SW & FEM**

CIRCUIT

SIM 1

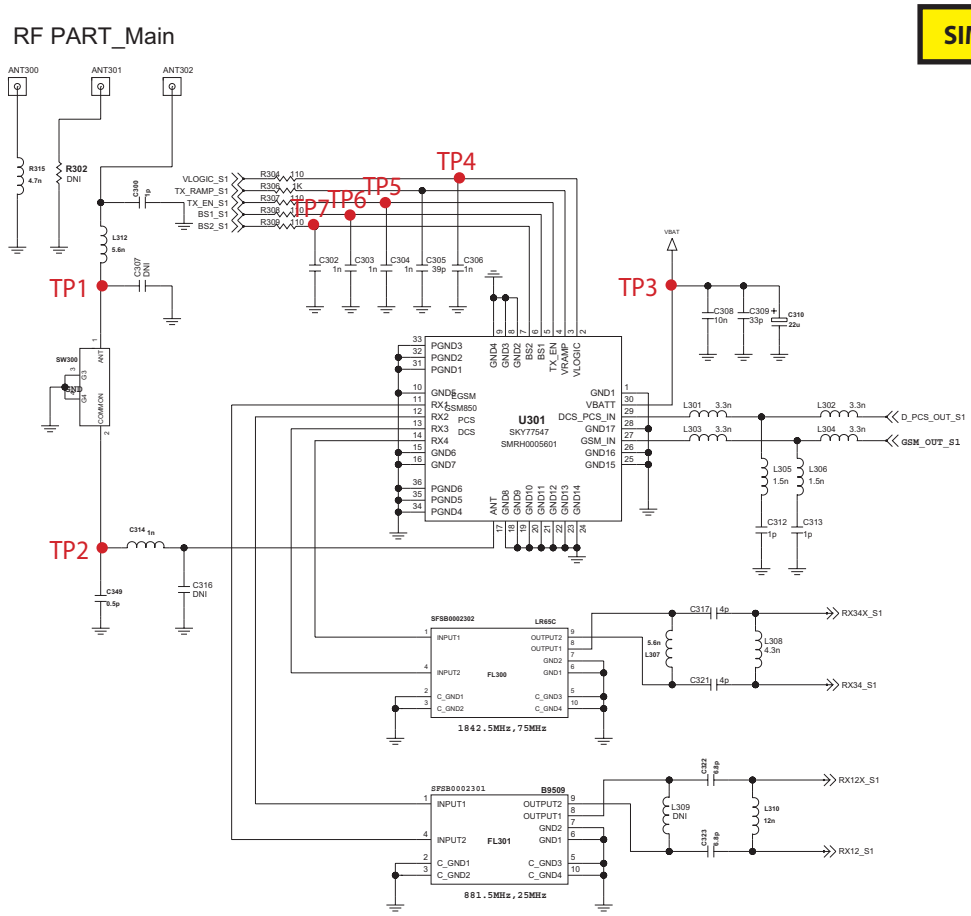



**Figure 4.3.8 SIM 1 Mobile SW & FEM circuit**

CONTROL LOGIC

EGSM Rx

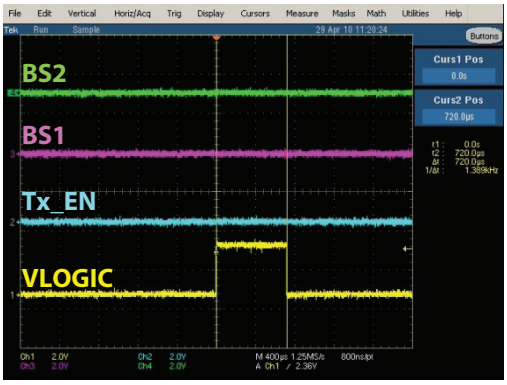



**Figure 4.3.9 SIM 1 TP4 ~ TP7 scope waveform**

CIRCUIT

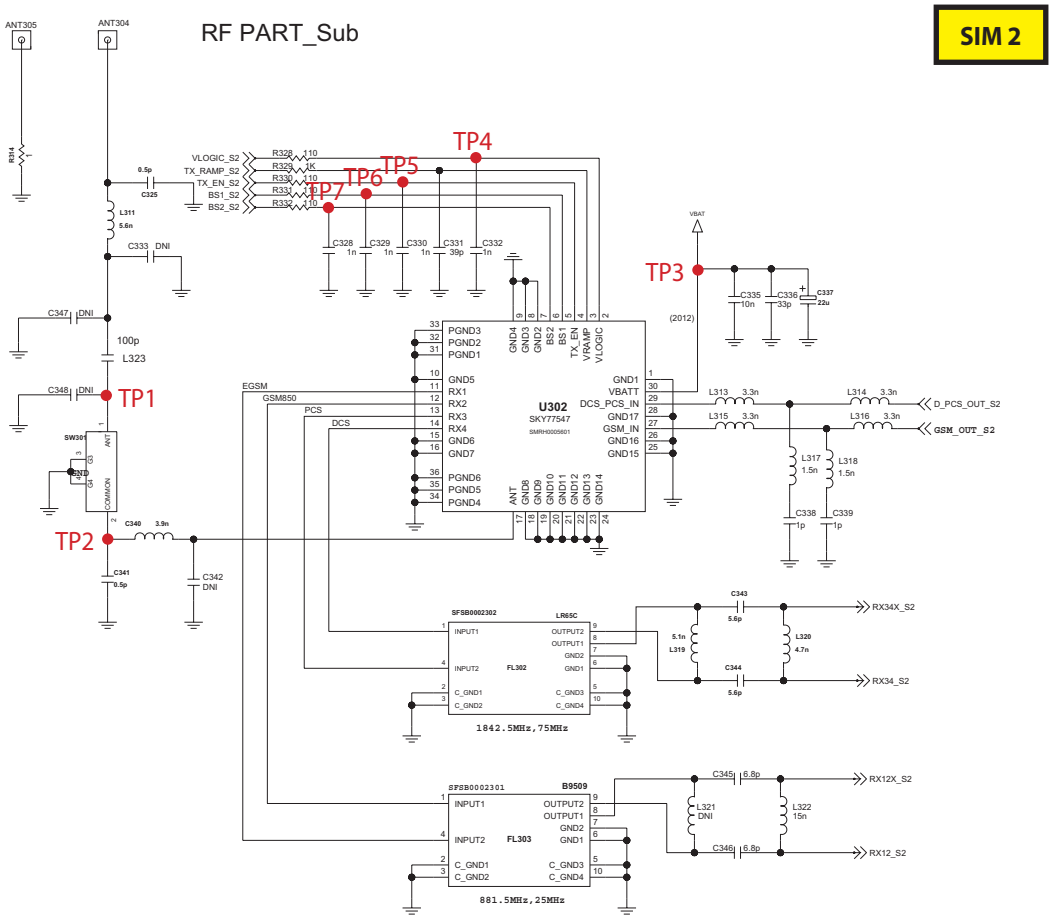



**Figure 4.3.10 SIM 2 Mobile SW & FEM circuit**

CONTROL LOGIC

**EGSM Rx**

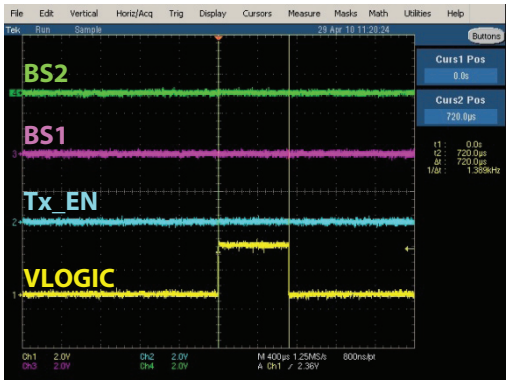
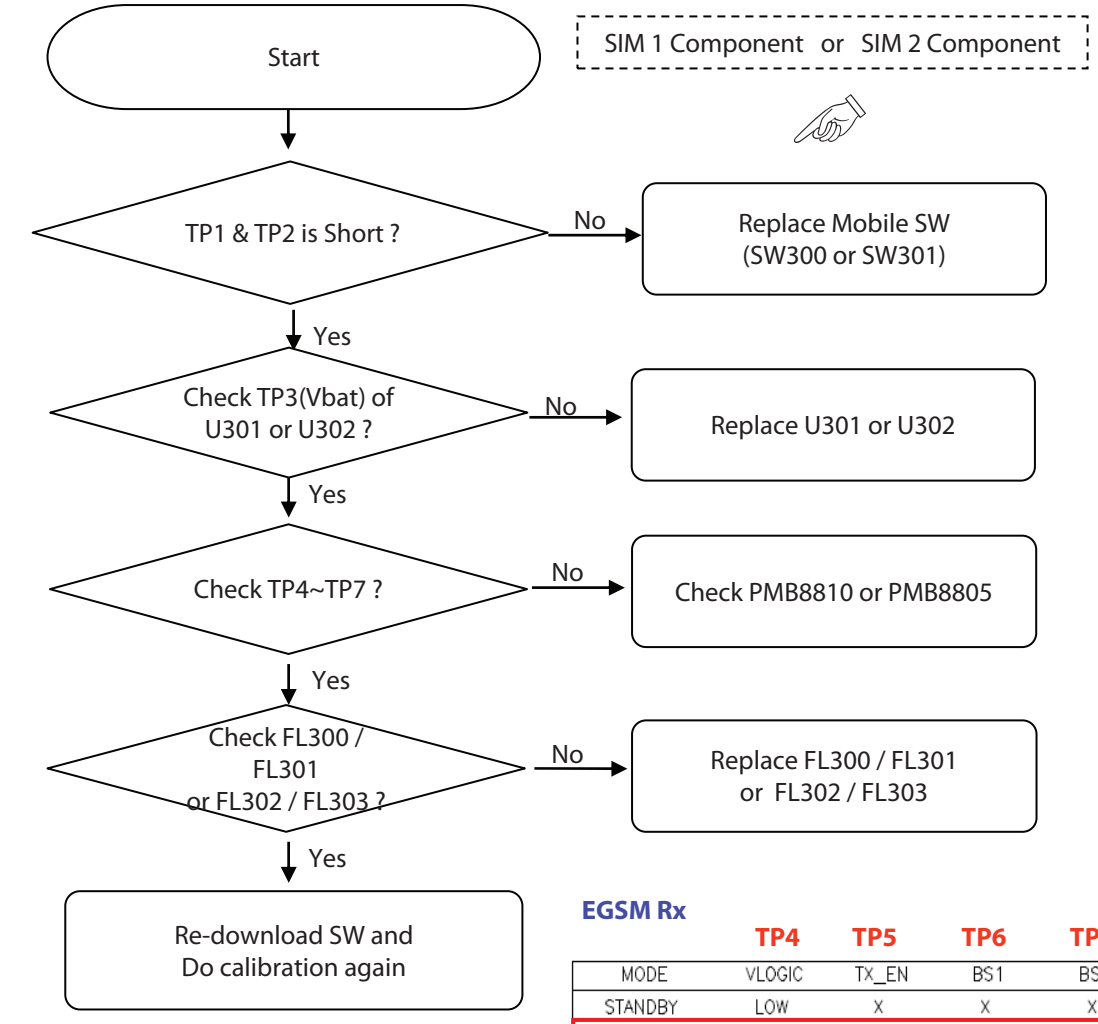



**Figure 4.3.11 SIM 2 TP4 ~ TP7 scope waveform**

CHECKING FLOW

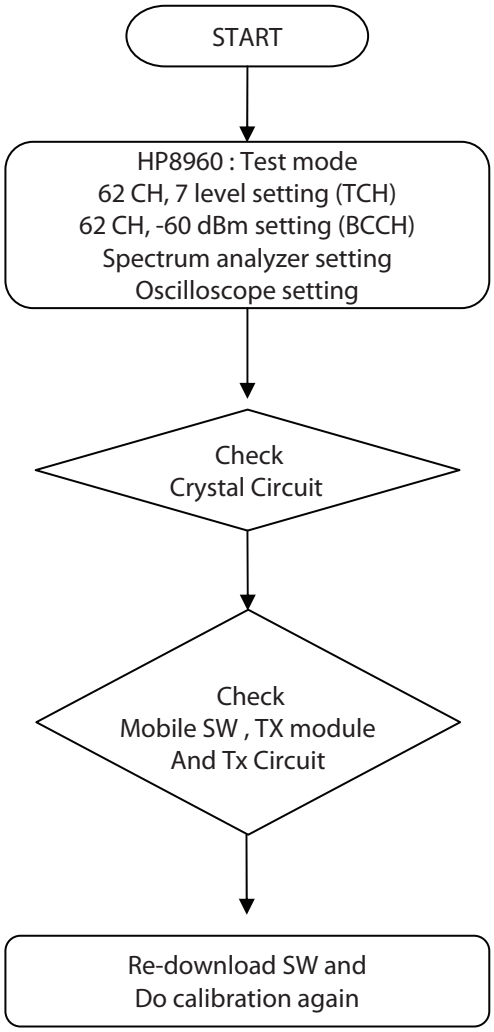



**EGSM Rx**

| | TP4 | TP5 | TP6 | TP7 |
|---|---|---|---|---|
| MODE | VLOGIC | TX_EN | BS1 | BS2 |
| STANDBY | LOW | X | X | X |
| EGSM_RX | HIGH | LOW | LOW | LOW |
| GSM850_RX | HIGH | LOW | LOW | HIGH |
| PCS_RX | HIGH | LOW | HIGH | HIGH |
| DCS_RX | HIGH | LOW | HIGH | LOW |
| LB_TX | HIGH | HIGH | LOW | X |
| HB_TX | HIGH | HIGH | HIGH | X |

## 4.4 TX Trouble

CHECKING FLOW



## 4.4.1 Checking Crystal Circuit

TEST POINT

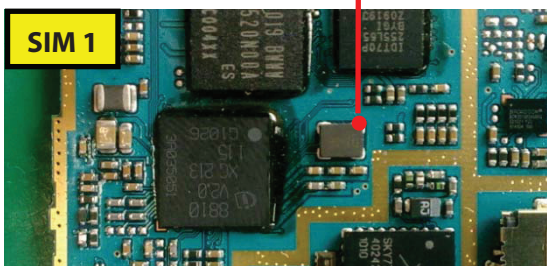



Figure 4.4.1 SIM 1 (main) crystal

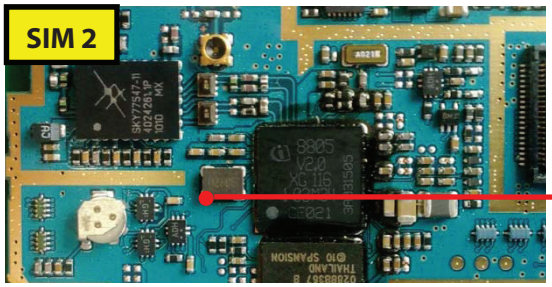
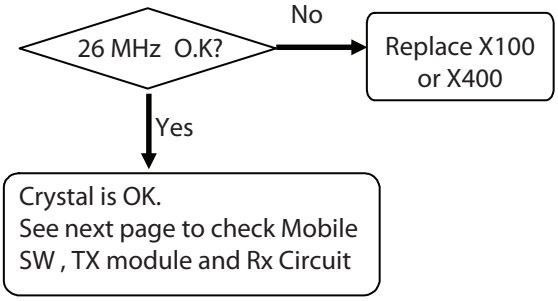



Figure 4.4.2 SIM 2 (sub) crystal

CHECKING FLOW




CIRCUIT

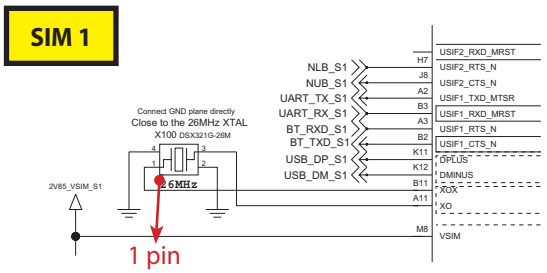



Figure 4.4.3 SIM 1 crystal circuit

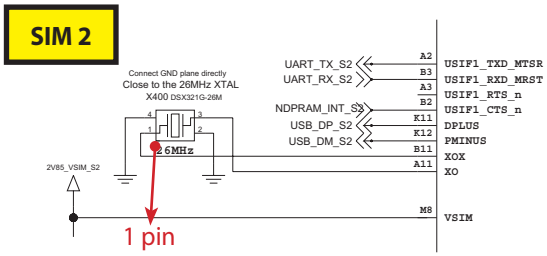



Figure 4.4.4 SIM 2 crystal circuit

WAVEFORM

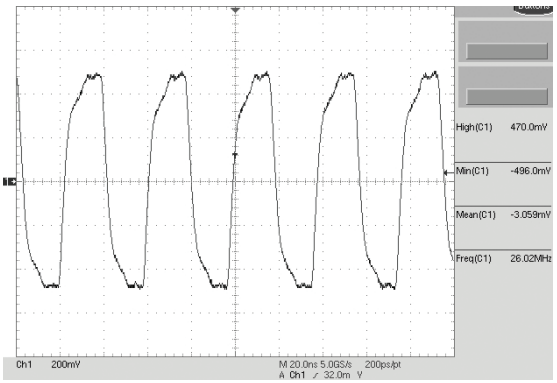



Figure 4.4.5 26MHz output waveform

### 4.4.2 Checking Mobile SW & TX Module

TEST POINT

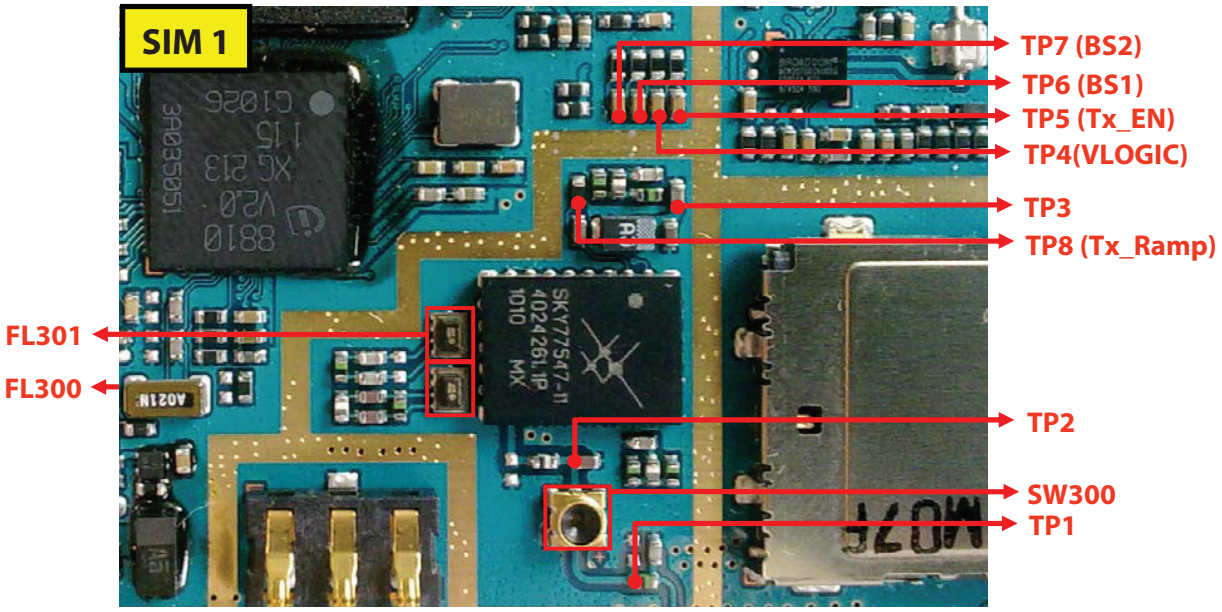



**Figure 4.4.6 SIM 1 Mobile SW & TX Module**

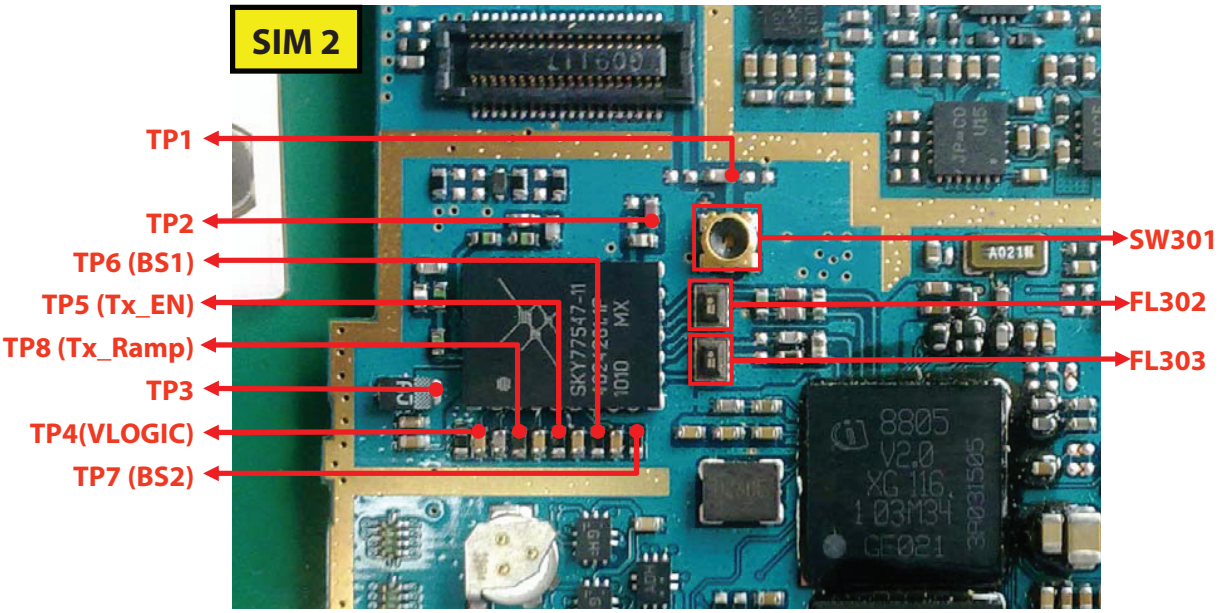



**Figure 4.4.7 SIM 2 Mobile SW & TX Module**

CIRCUIT

SIM 1

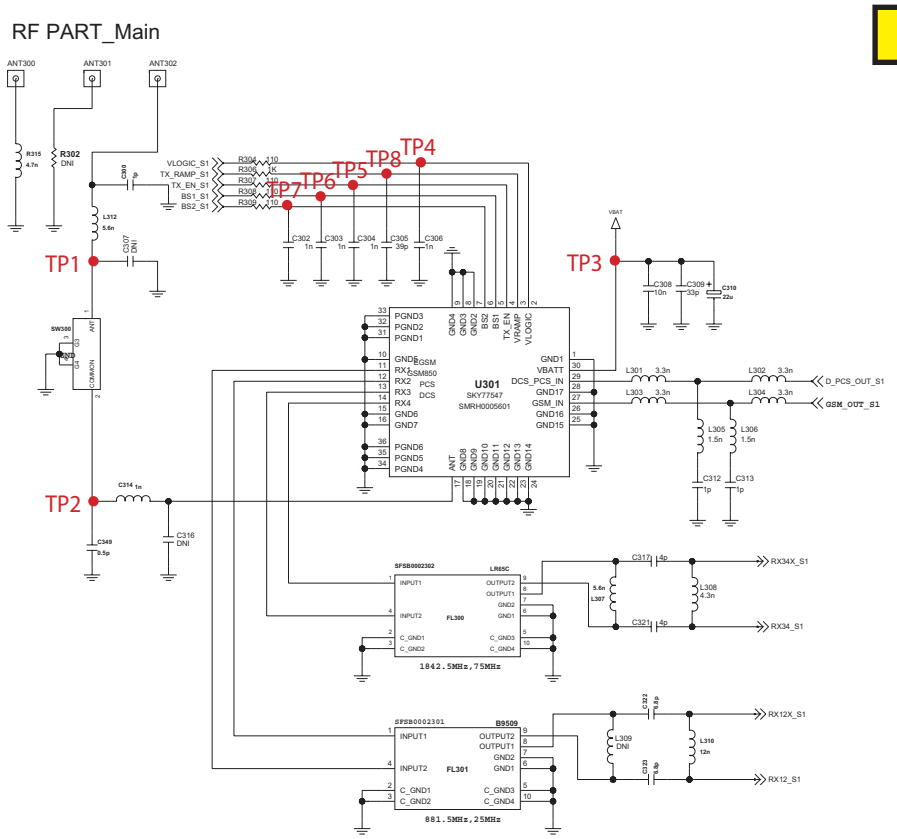



**Figure 4.4.8 SIM1 Mobile SW & TX Module circuit**

CONTROL LOGIC

**Low Band Tx**

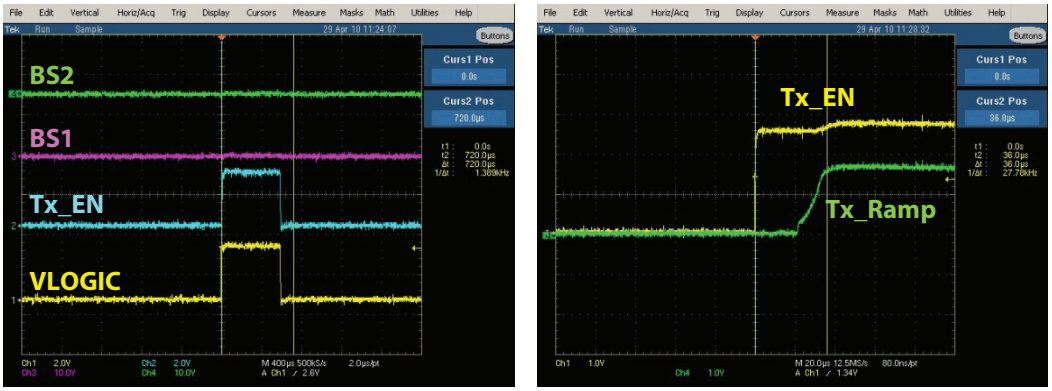



**Figure 4.4.9 SIM1 TP4 ~ TP8 scope waveform**

CIRCUIT

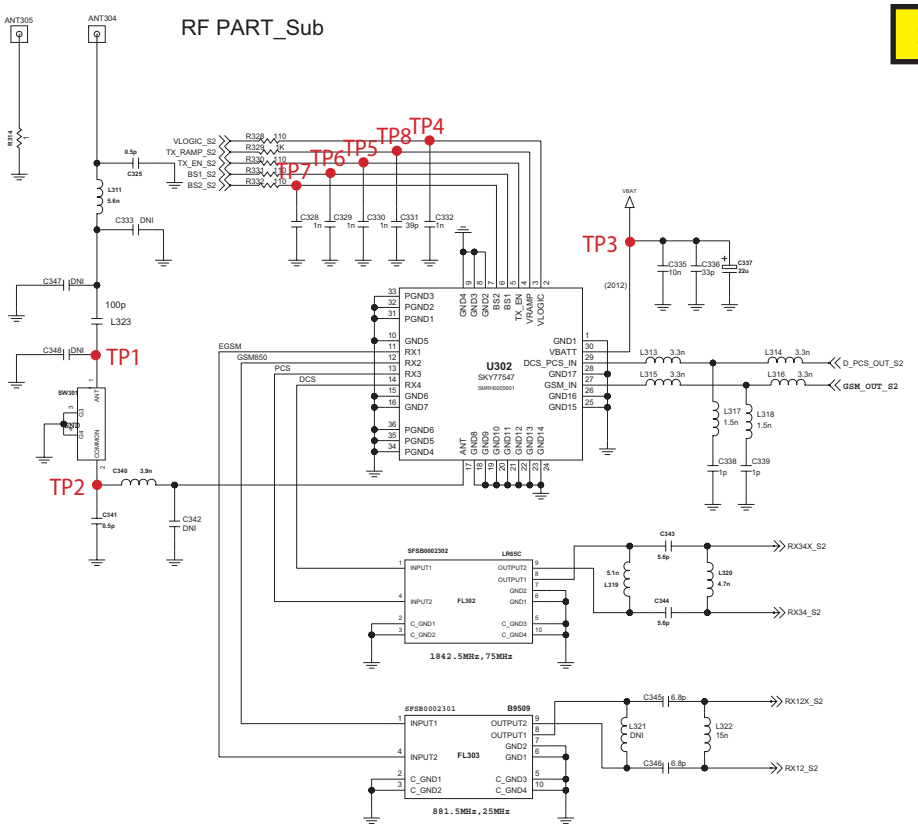



**Figure 4.4.10 SIM 2 Mobile SW & TX Module circuit**

CONTROL LOGIC

**Low Band Tx**

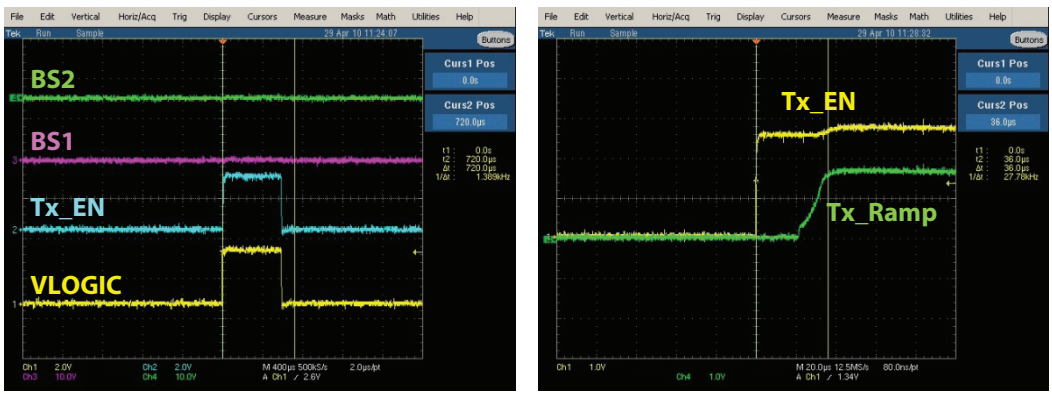
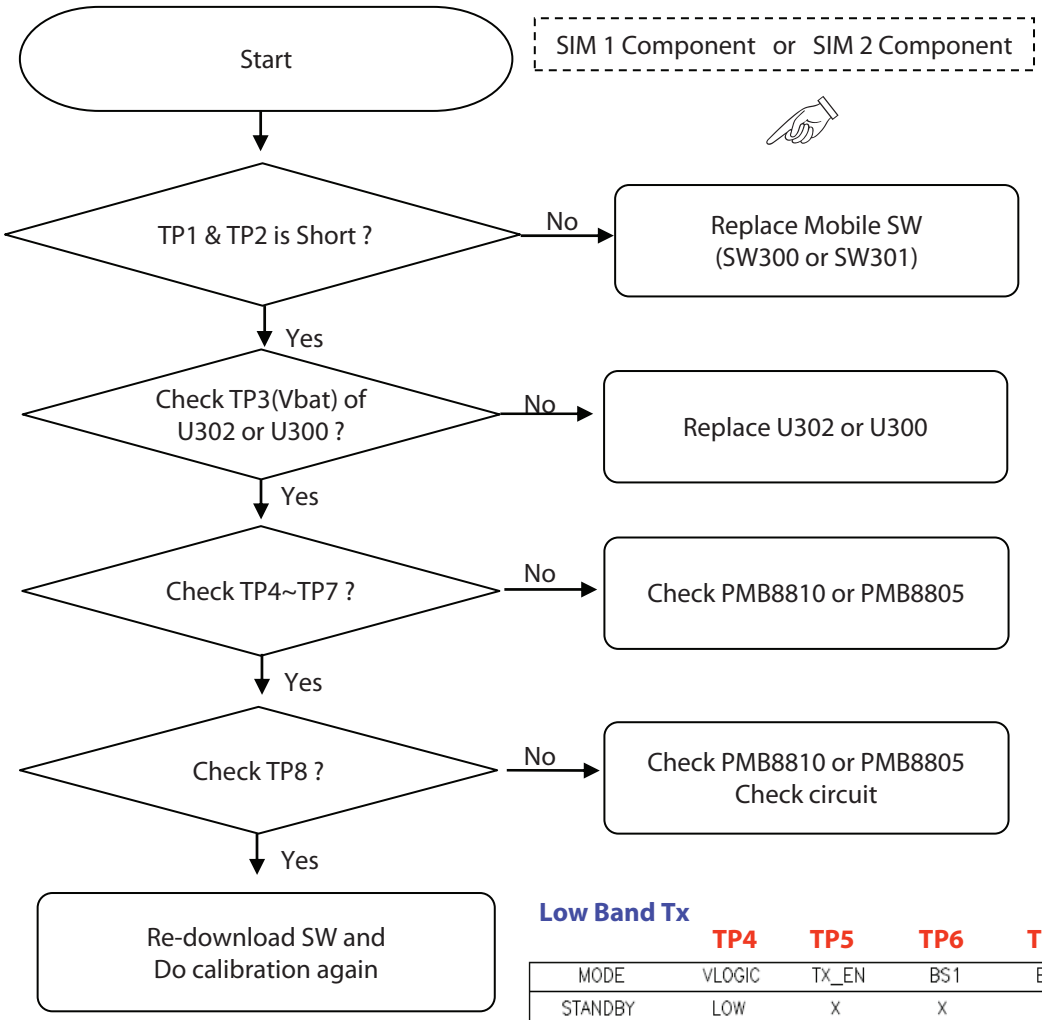



**Figure 4.4.11 SIM 2 TP4 ~ TP8 scope waveform**

CHECKING FLOW




**Low Band Tx**

| | TP4 | TP5 | TP6 | TP7 |
|---|---|---|---|---|
| MODE | VLOGIC | TX_EN | BS1 | BS2 |
| STANDBY | LOW | X | X | X |
| EGSM_RX | HIGH | LOW | LOW | LOW |
| GSM850_RX | HIGH | LOW | LOW | HIGH |
| PCS_RX | HIGH | LOW | HIGH | HIGH |
| DCS_RX | HIGH | LOW | HIGH | LOW |
| LB_TX | HIGH | HIGH | LOW | X |
| HB_TX | HIGH | HIGH | HIGH | X |

## 4.5 Power On Trouble

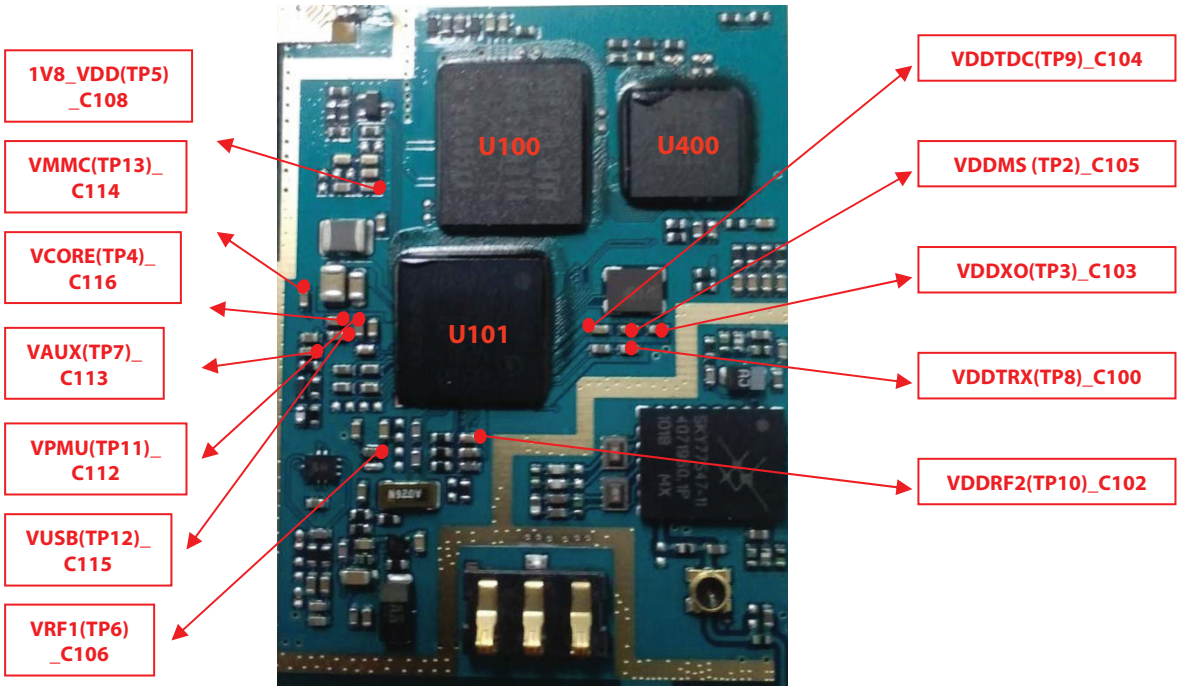



**Figure 4.5.1**

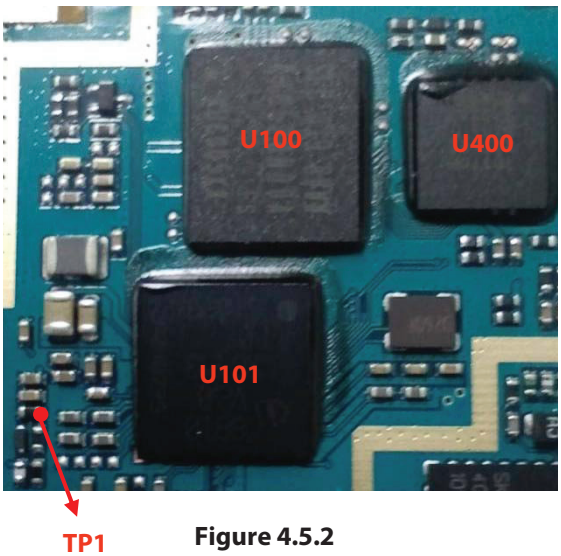



**Figure 4.5.2**

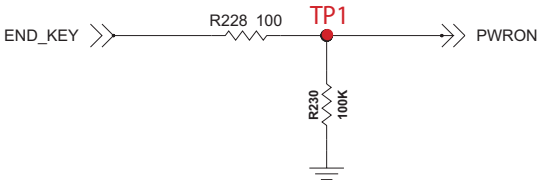



**Figure 4.5.3 Remote power on**

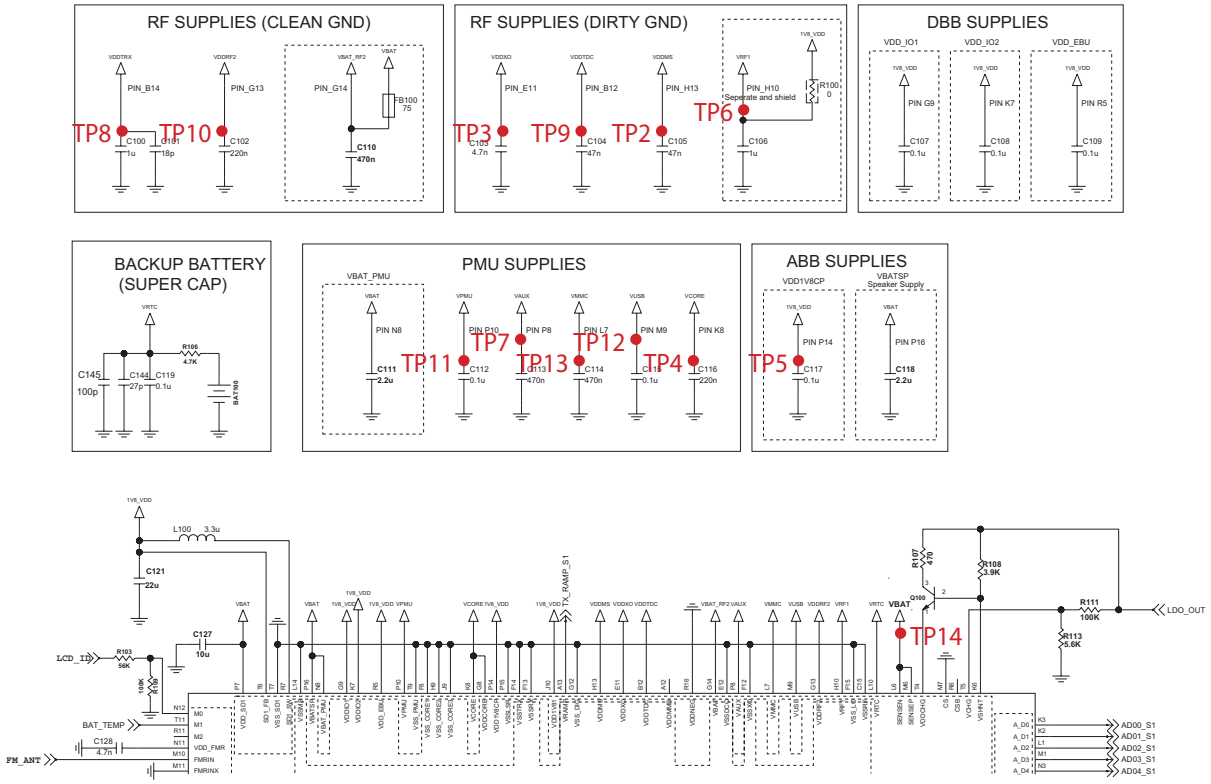
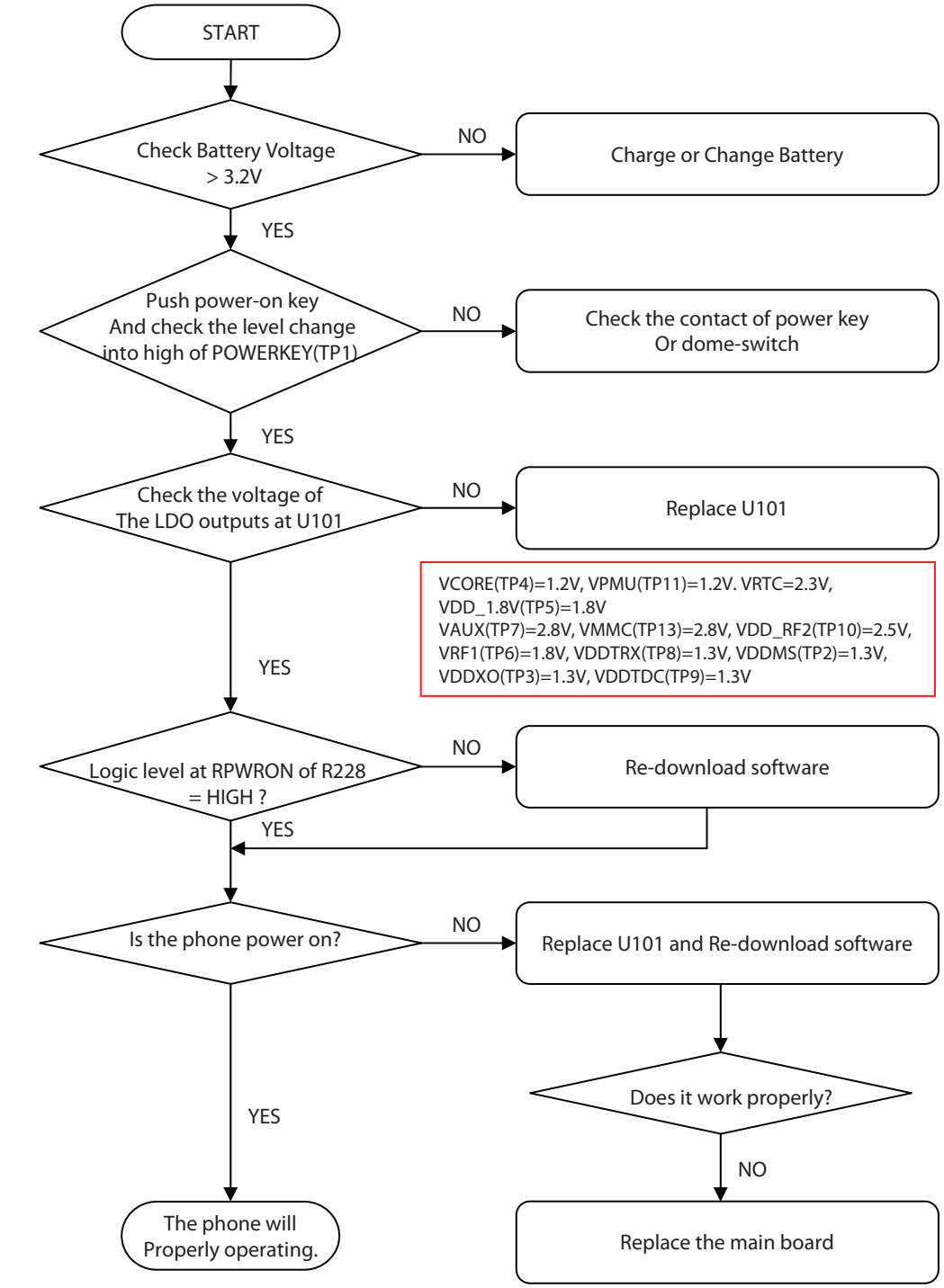



**Figure 4.5.4 power block of LGP520**

CHECKING FLOW



## 4.6 Charging Trouble

TEST POINT

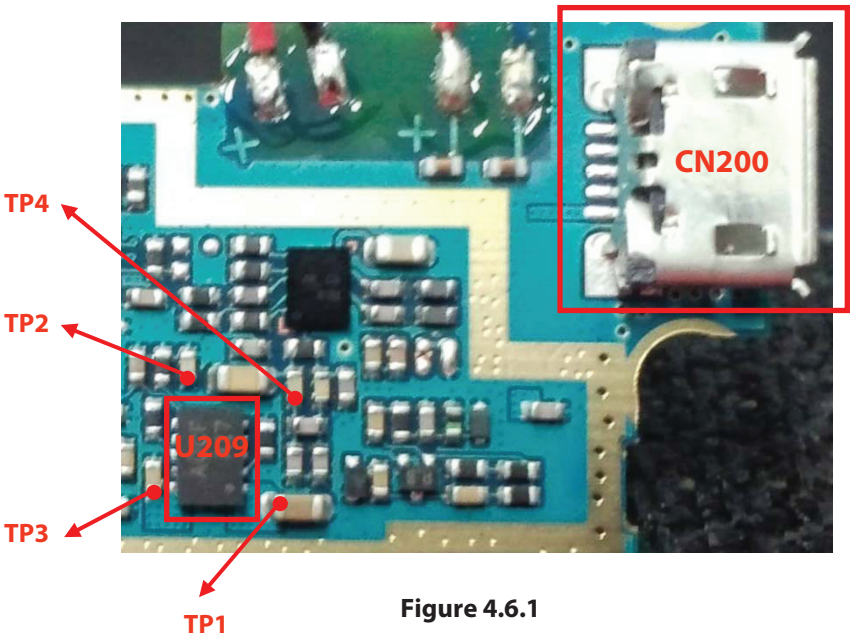



**Figure 4.6.1**

CIRCUIT

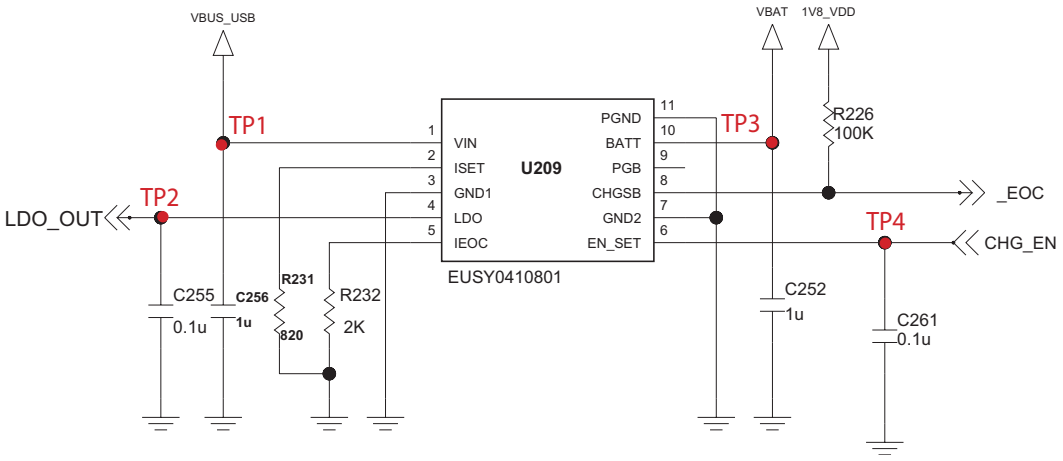
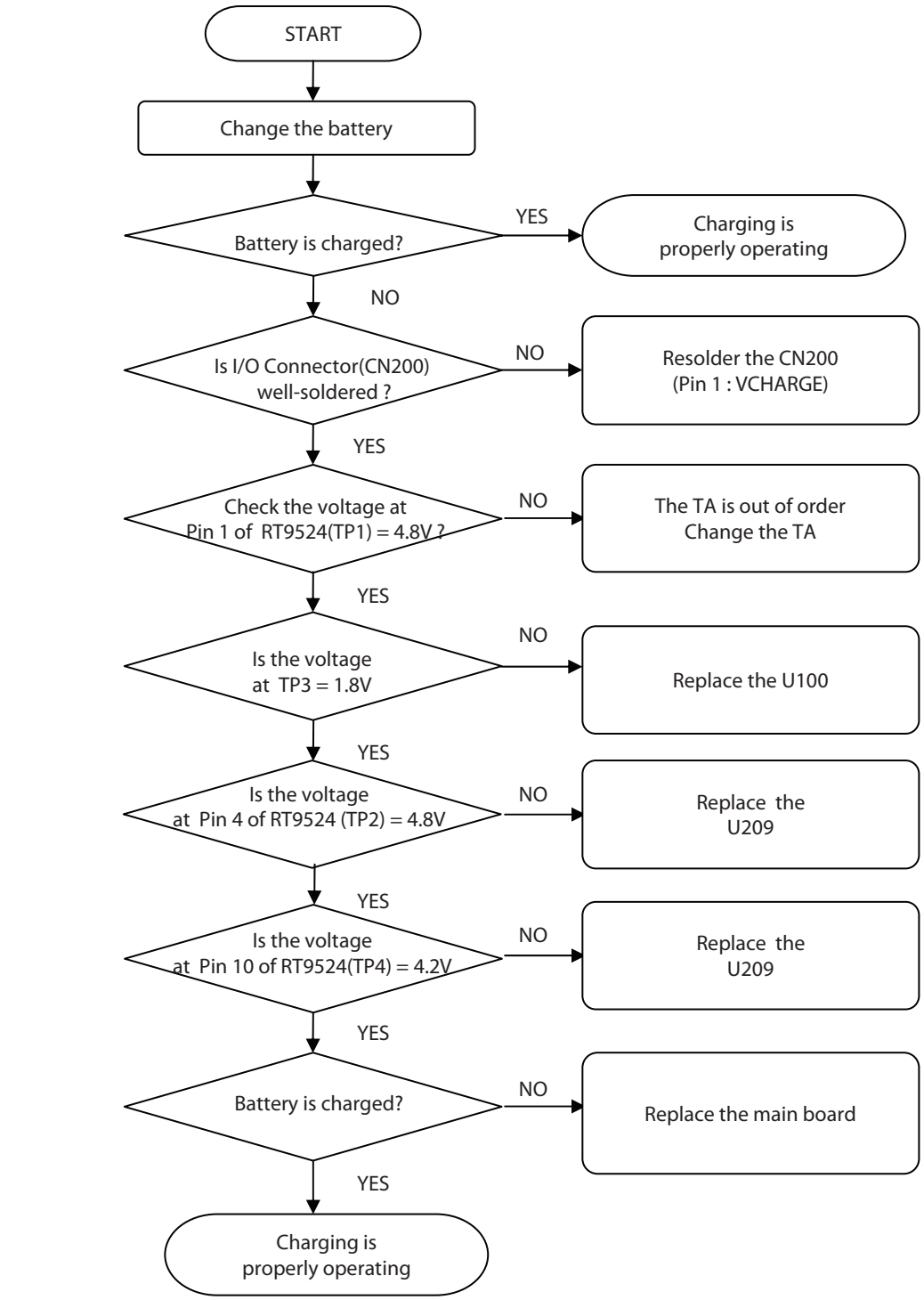



**Figure 4.6.2**

CHECKING FLOW



## 4.7 Vibrator Trouble

TEST POINT

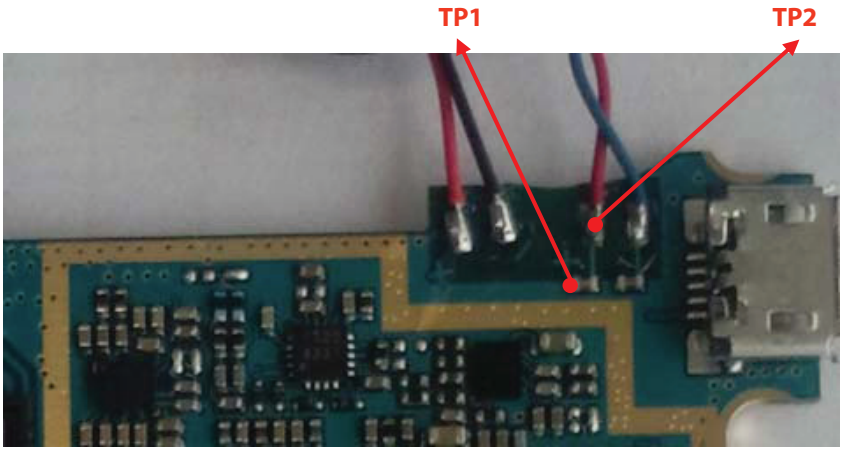



**Figure 4.7.1**

CIRCUIT

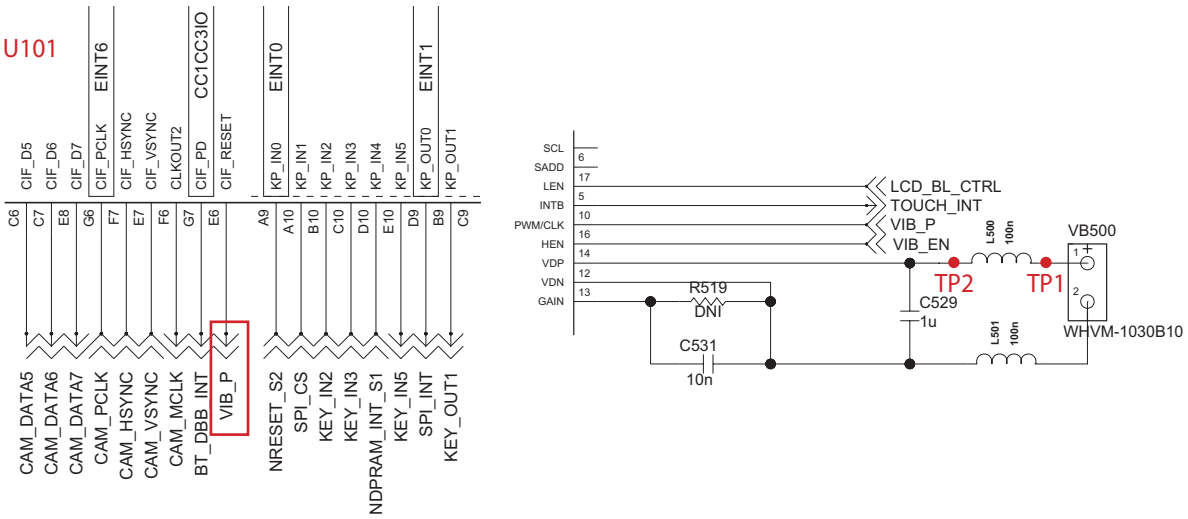
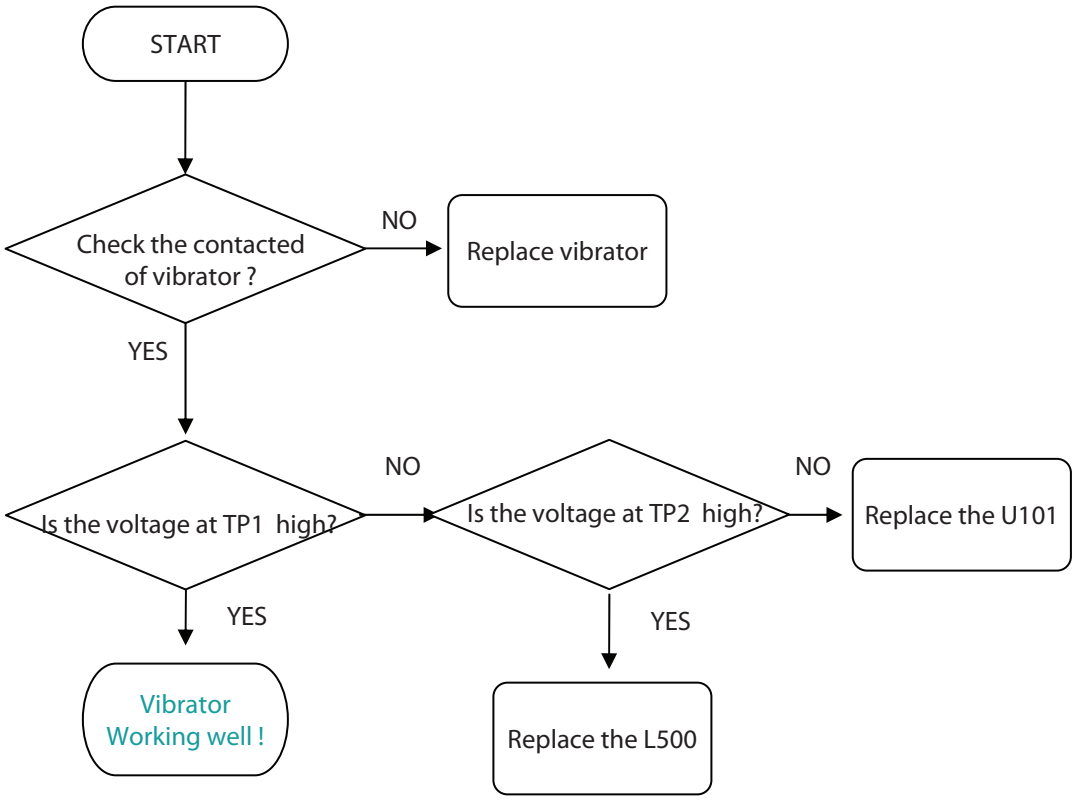



**Figure 4.7.2**

CHECKING FLOW

SETTING : Enter the engineering mode, and set vibrator on at vibration of BB test menu



## 4.8 LCD Trouble

TEST POINT

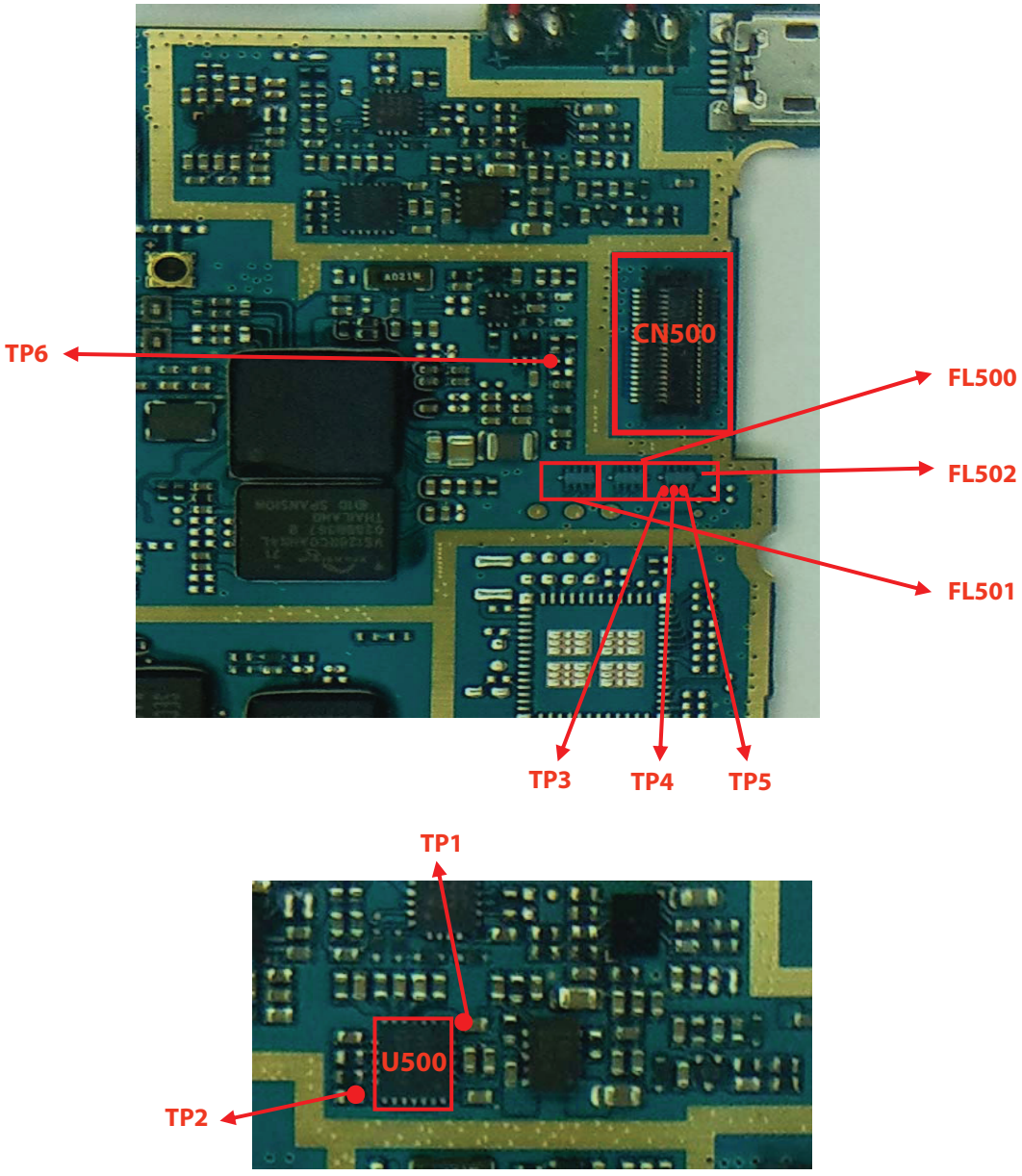



**Figure 4.8.1**

CIRCUIT

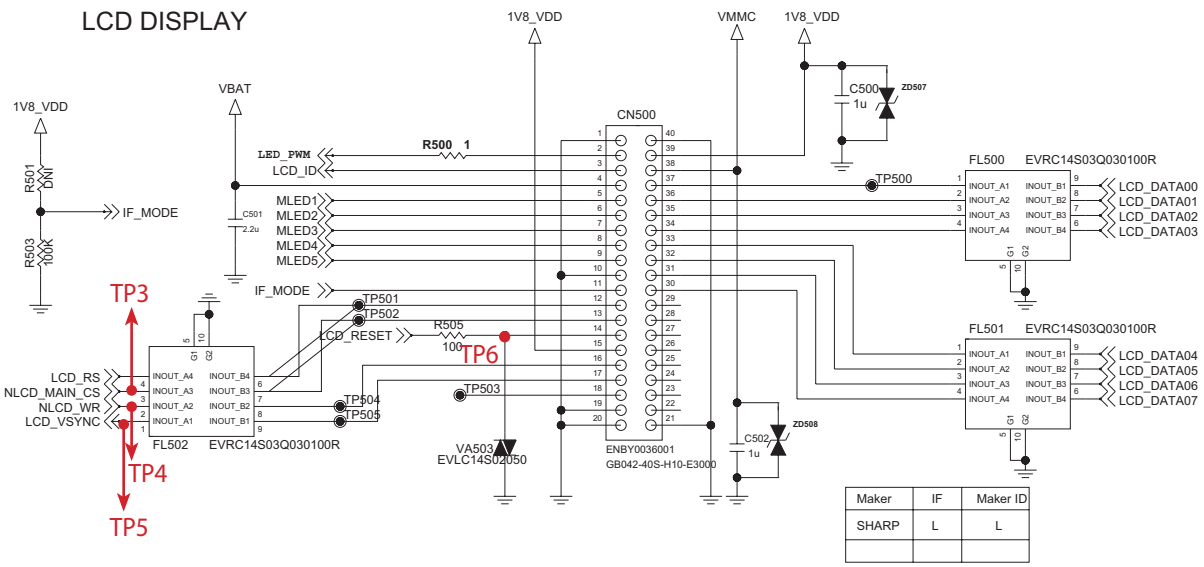
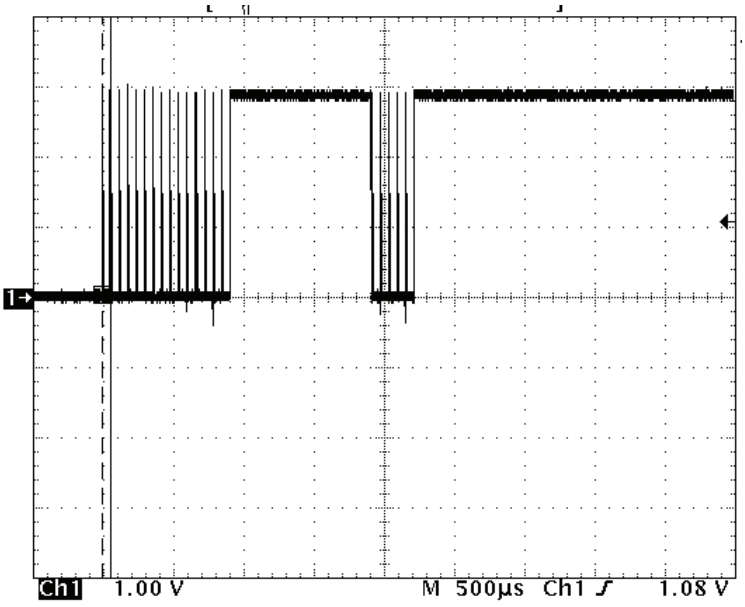



**Figure 4.8.2**

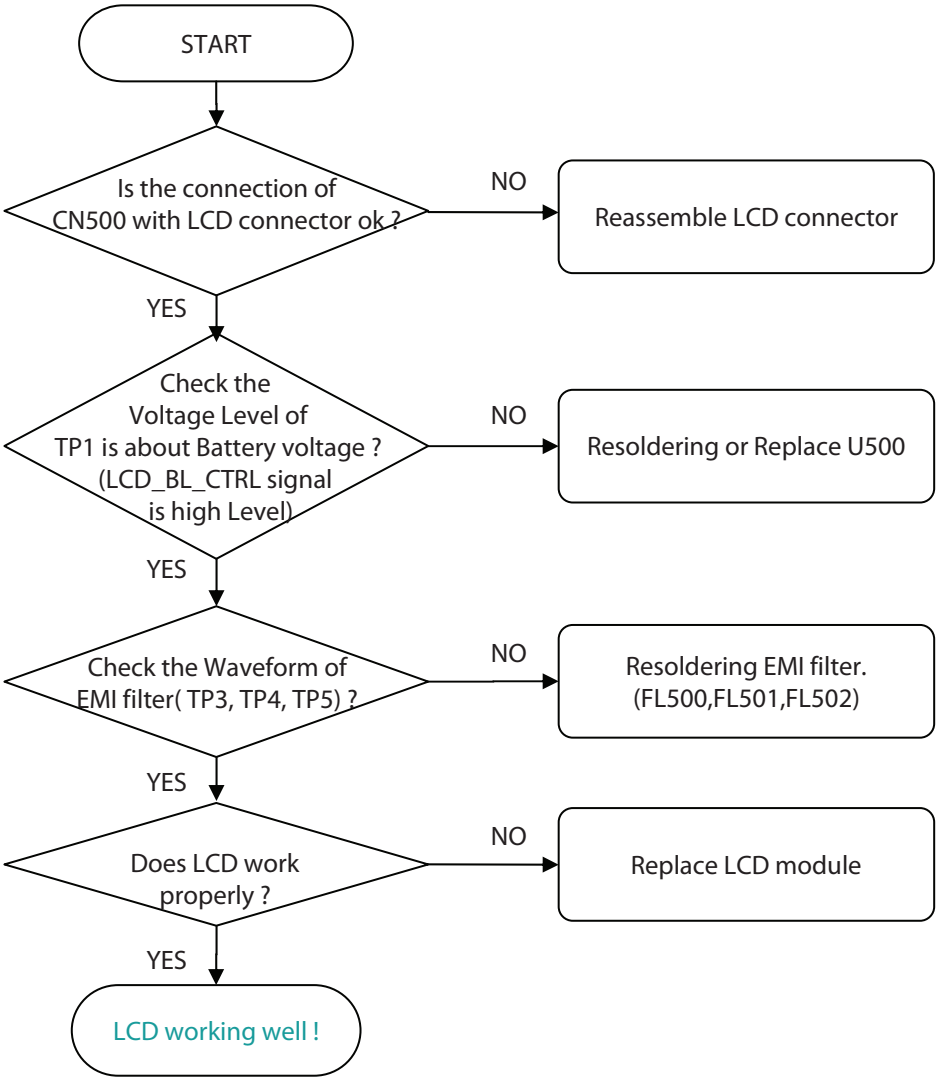
Waveform




**Graph 4.8.1. LCD Backlight Control Signal Waveform**


**Graph 4.8.2. LCD Data Waveform**

CHECKING FLOW



## 4.9 Camera Trouble

TEST POINT

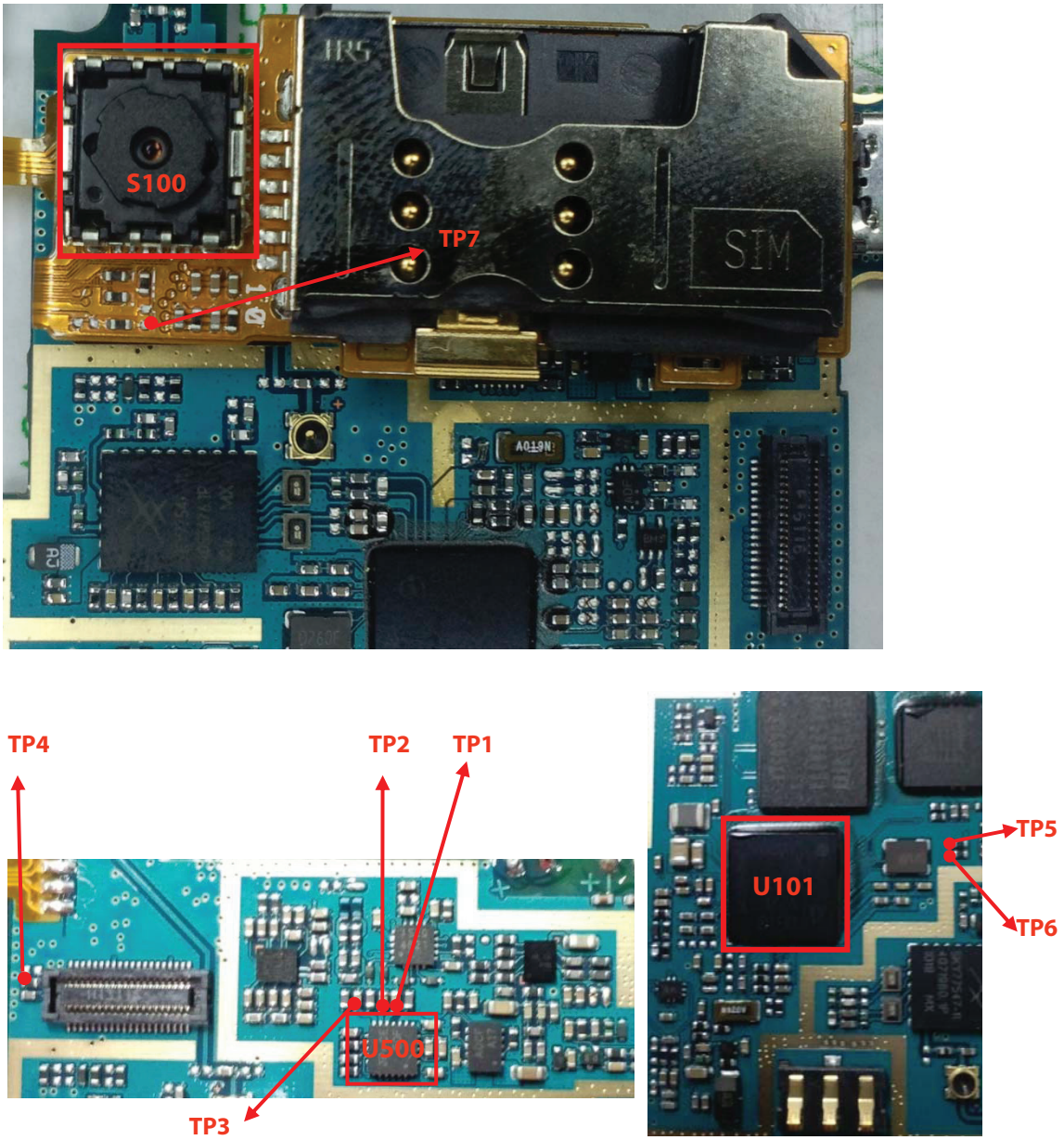



**Figure 4.9.1**

CIRCUIT

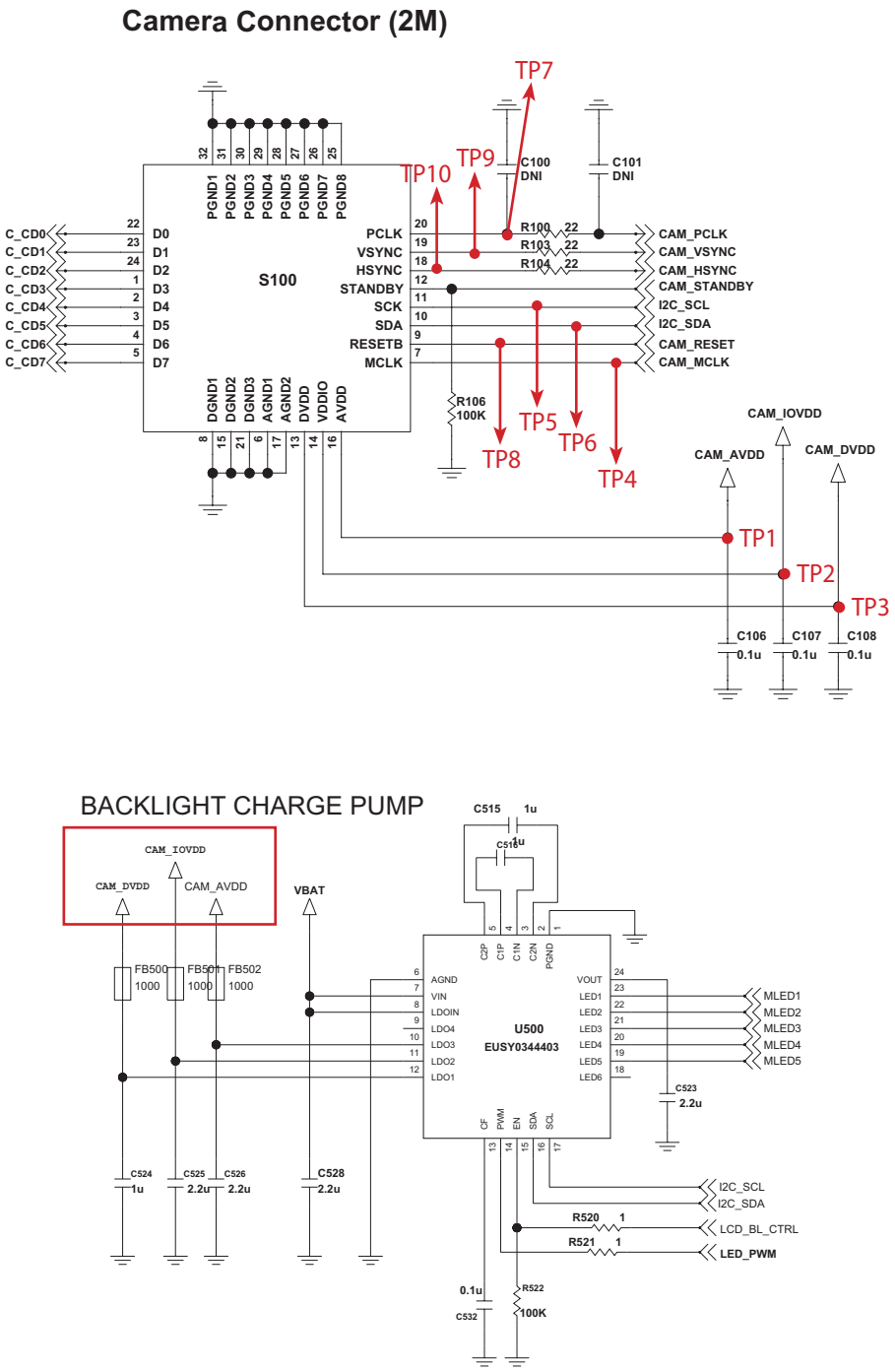
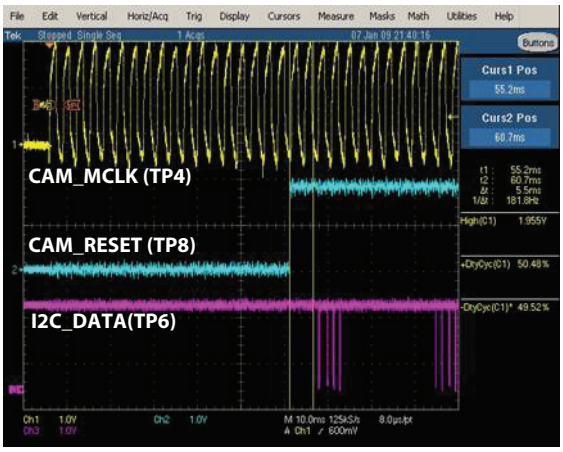
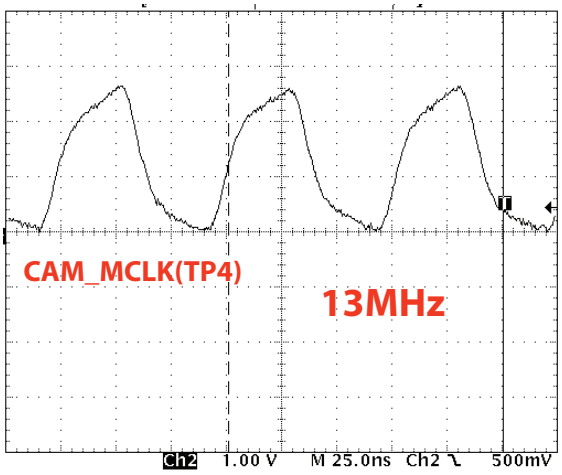



**Figure 4.9.2**

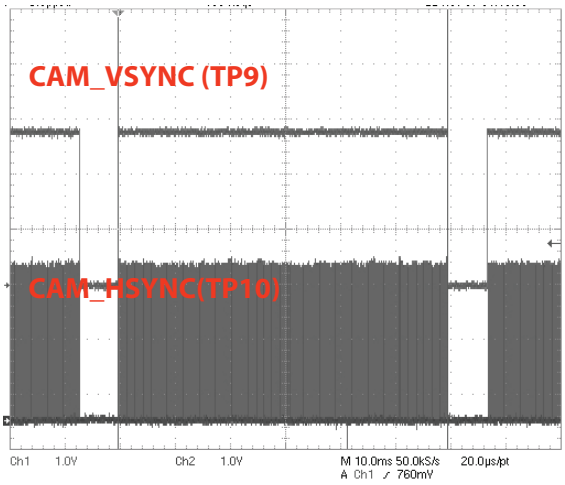
Waveform



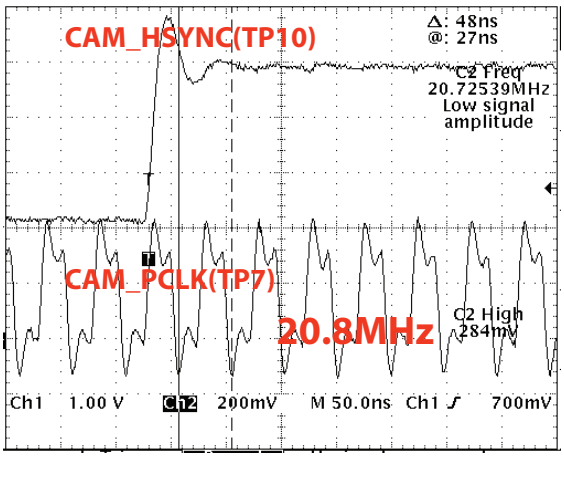

Graph 4.9.1. I2C Data Waveform



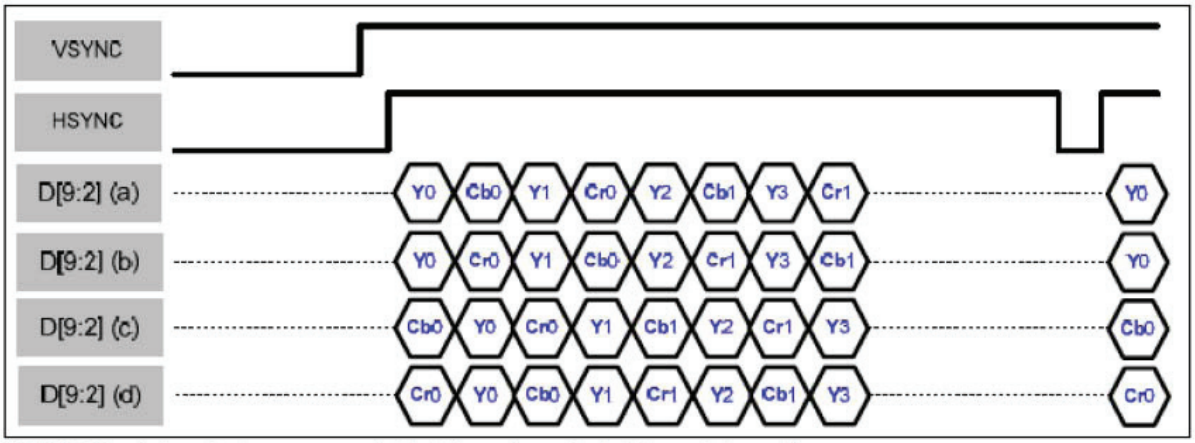

Graph 4.9.2. MCLK Waveform




Graph 4.9.3.CAM_VSYNC vs. CAM_HSYNC Waveform



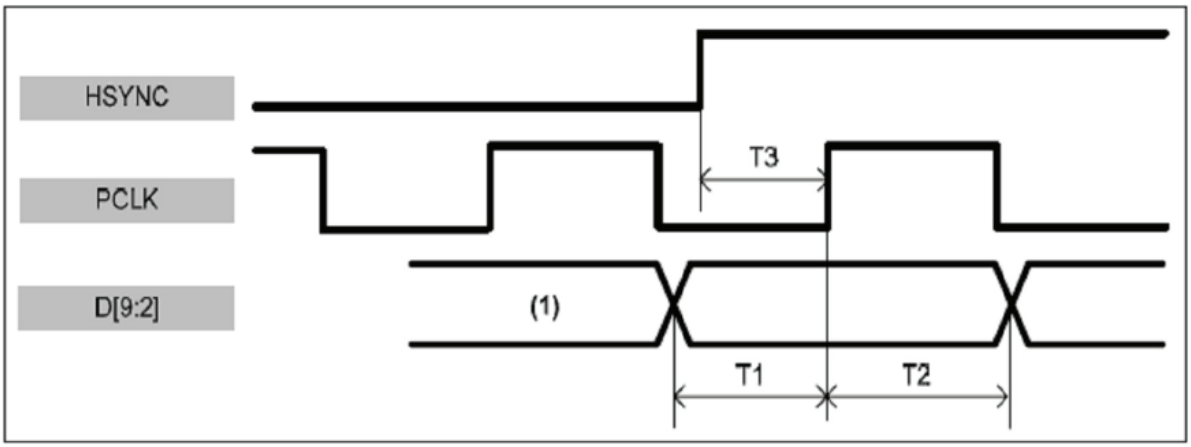

Graph 4.9.4.CAM_HSYNC vs. CAM_PCLK Waveform




[NOTE] The data output sequence, (a) to (d) can be selected by register setting.

**Graph 4.9.5.CAM Output Timing Waveform**

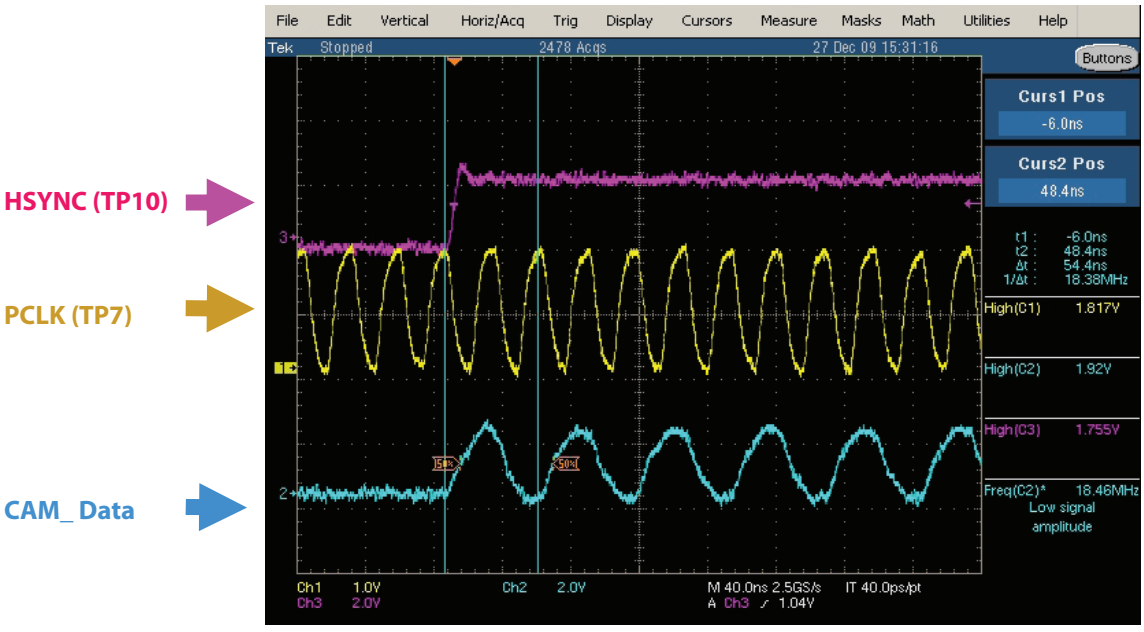

**Graph 4.9.6.CAM Output Timing Waveform**




[NOTE] (1): blank & start code, otherwise '0' for ITU-R.656 output format:

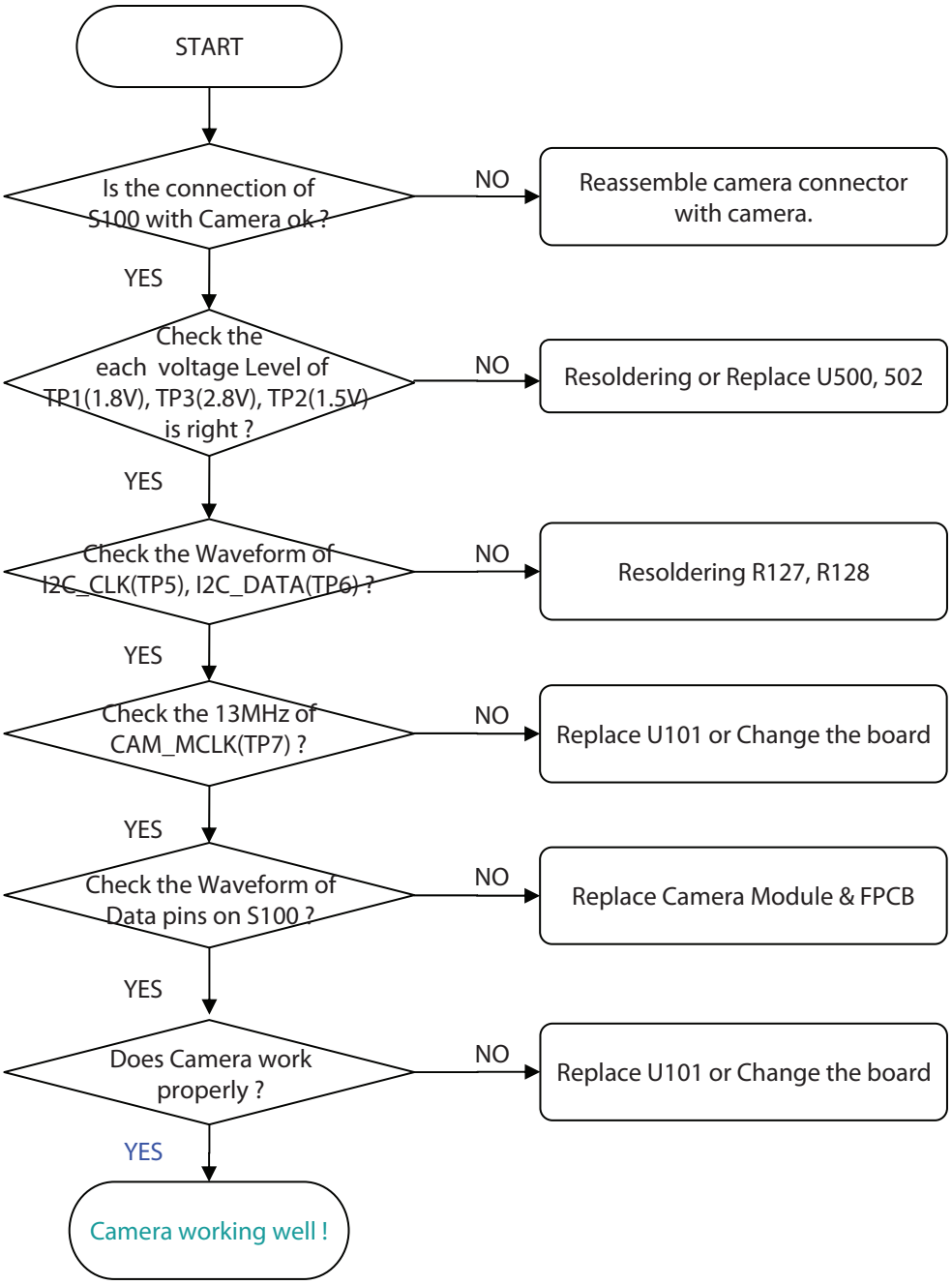
| SYMBOL | PARAMETER | MIN | MAX | UNIT |
|---|---|---|---|---|
| T1 | Data Setup Time to PCLK | 4 | - | ns |
| T2 | Data Hold Time to PCLK | 4 | - | ns |
| T3 | HSYNC↑ to PCLK↑ delay | 4 | - | ns |

**Graph 4.9.7. Output Data and Pixel Clock Timing**




**Graph 4.9.8. Output Data and Pixel Clock Timing**

CHECKING FLOW



## 4.10 Speaker Trouble

TEST POINT

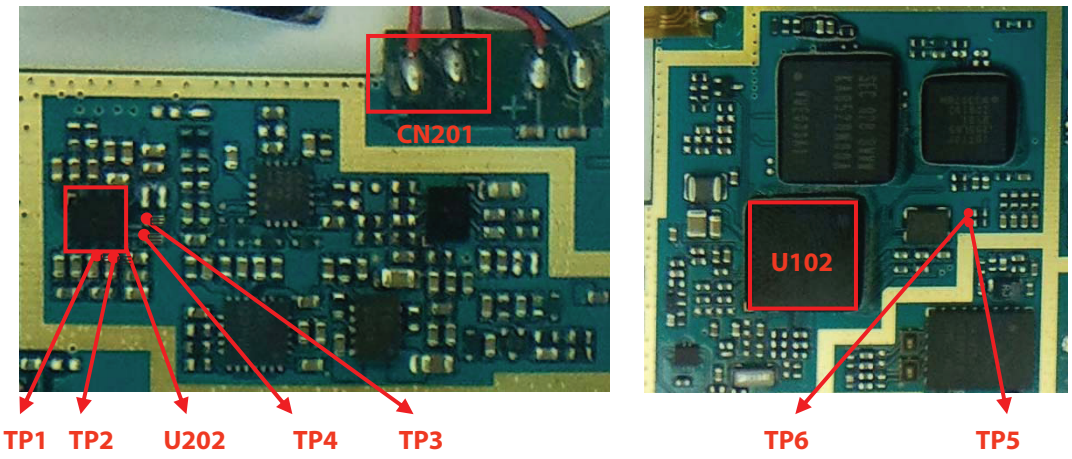



**Figure 4.10.1**

CIRCUIT

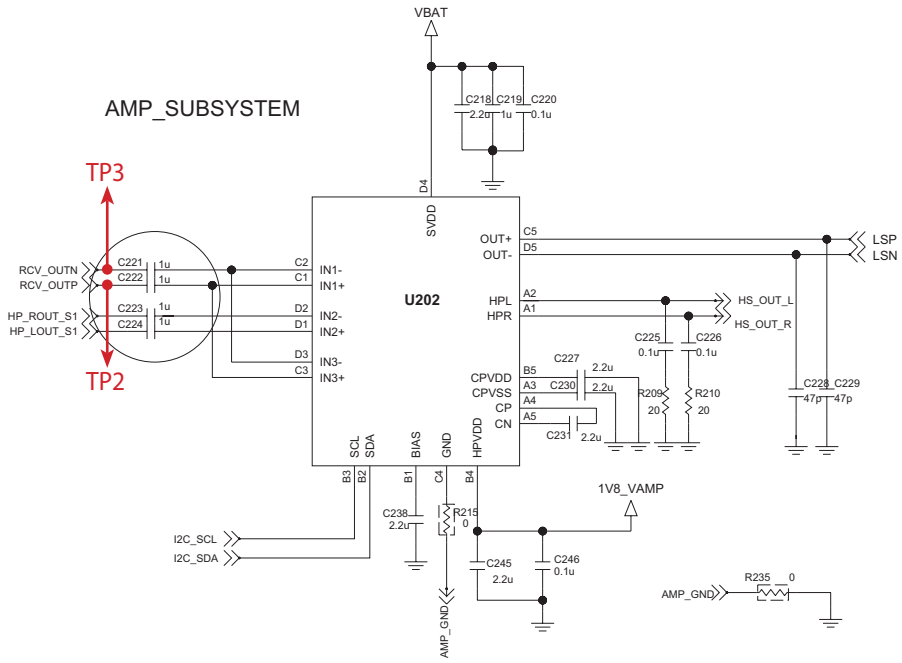



**Figure 4.10.2**

## 4.10 Speaker Trouble

CIRCUIT

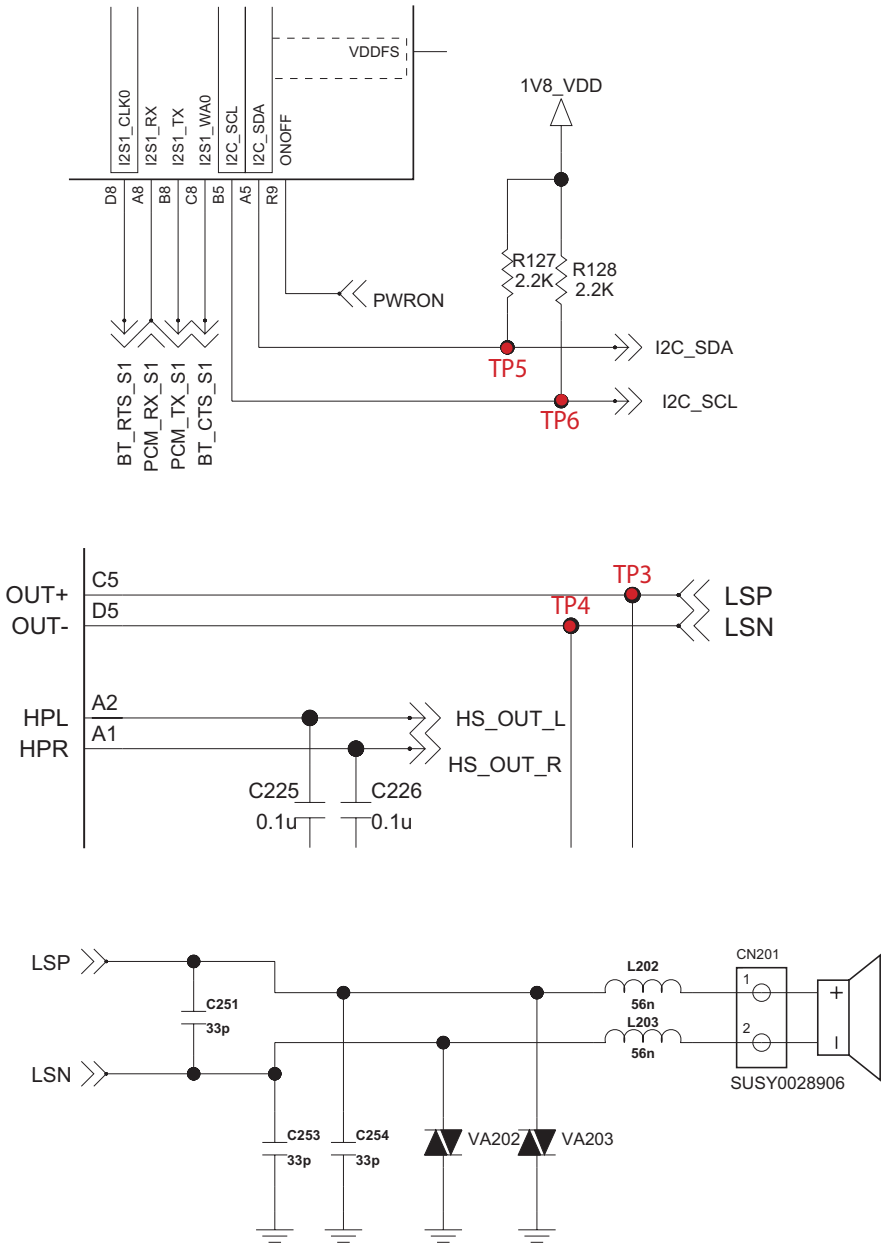
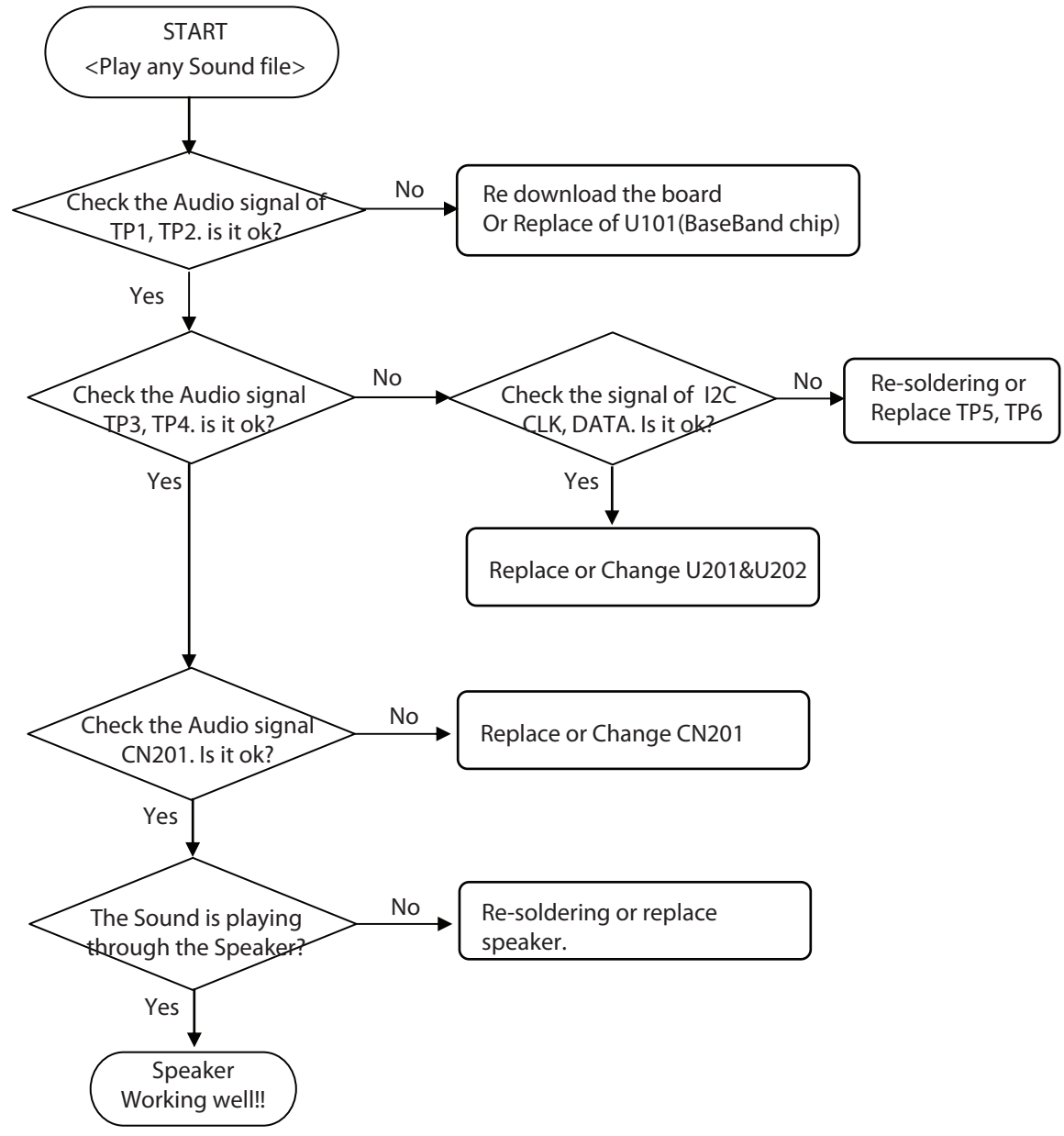



**Figure 4.10.3**

CHECKING FLOW



## 4.11 Earphone Trouble

TEST POINT

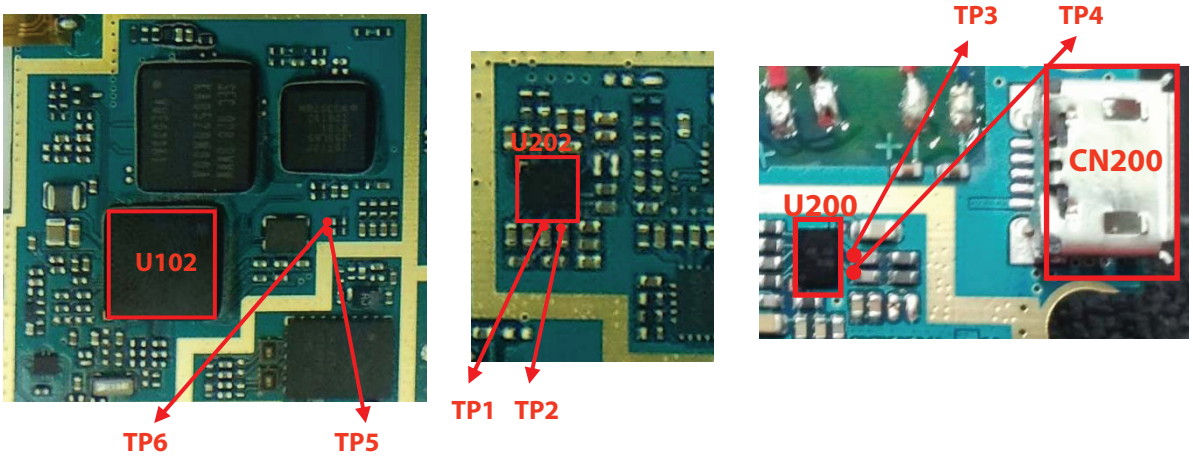



**Figure 4.11.1**

CIRCUIT

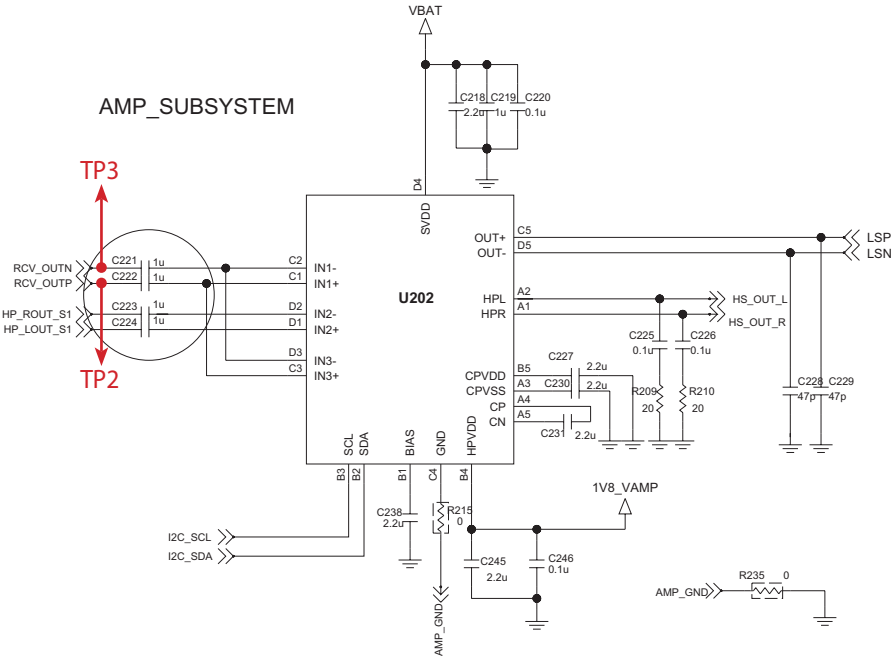



**Figure 4.11.2**

CIRCUIT

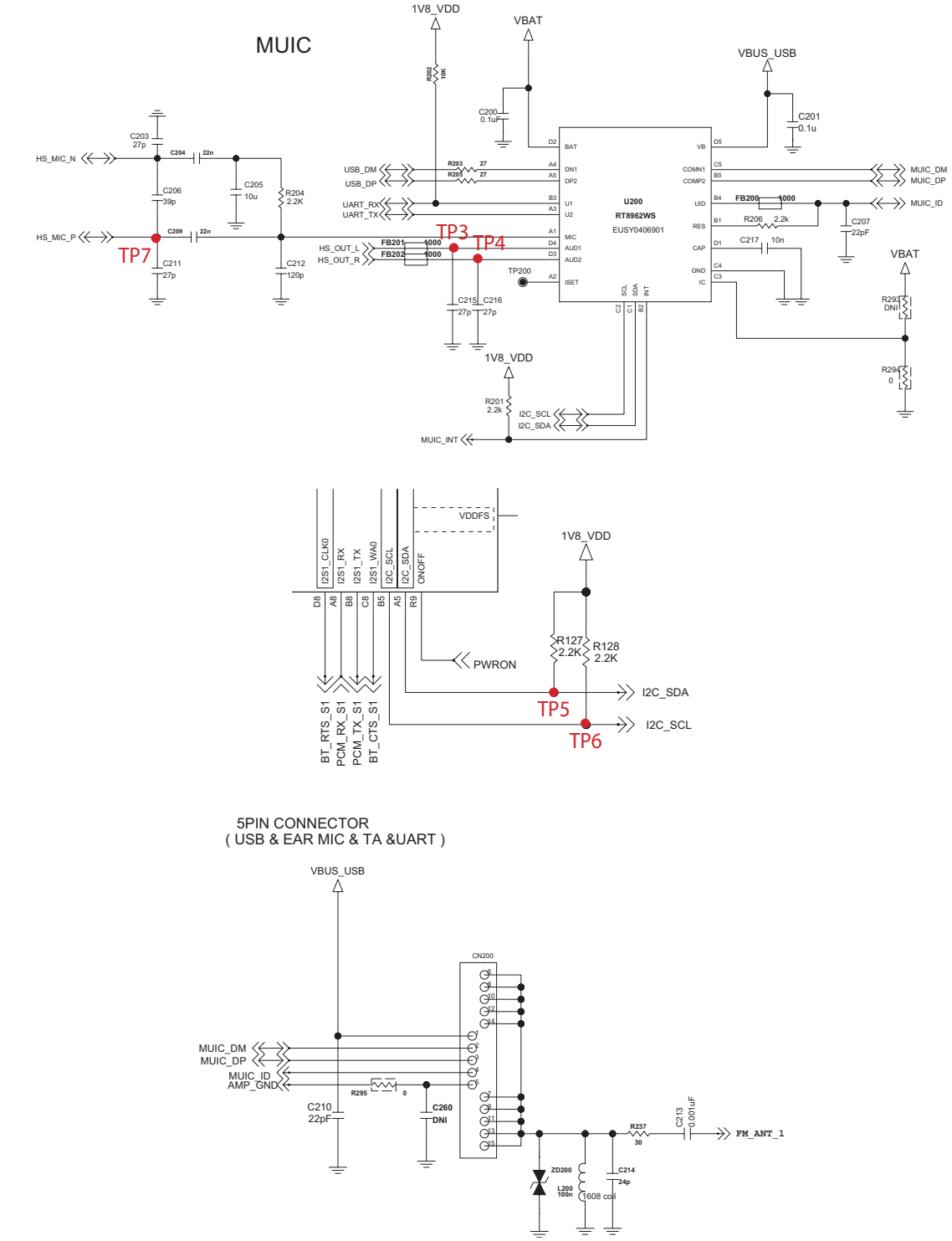
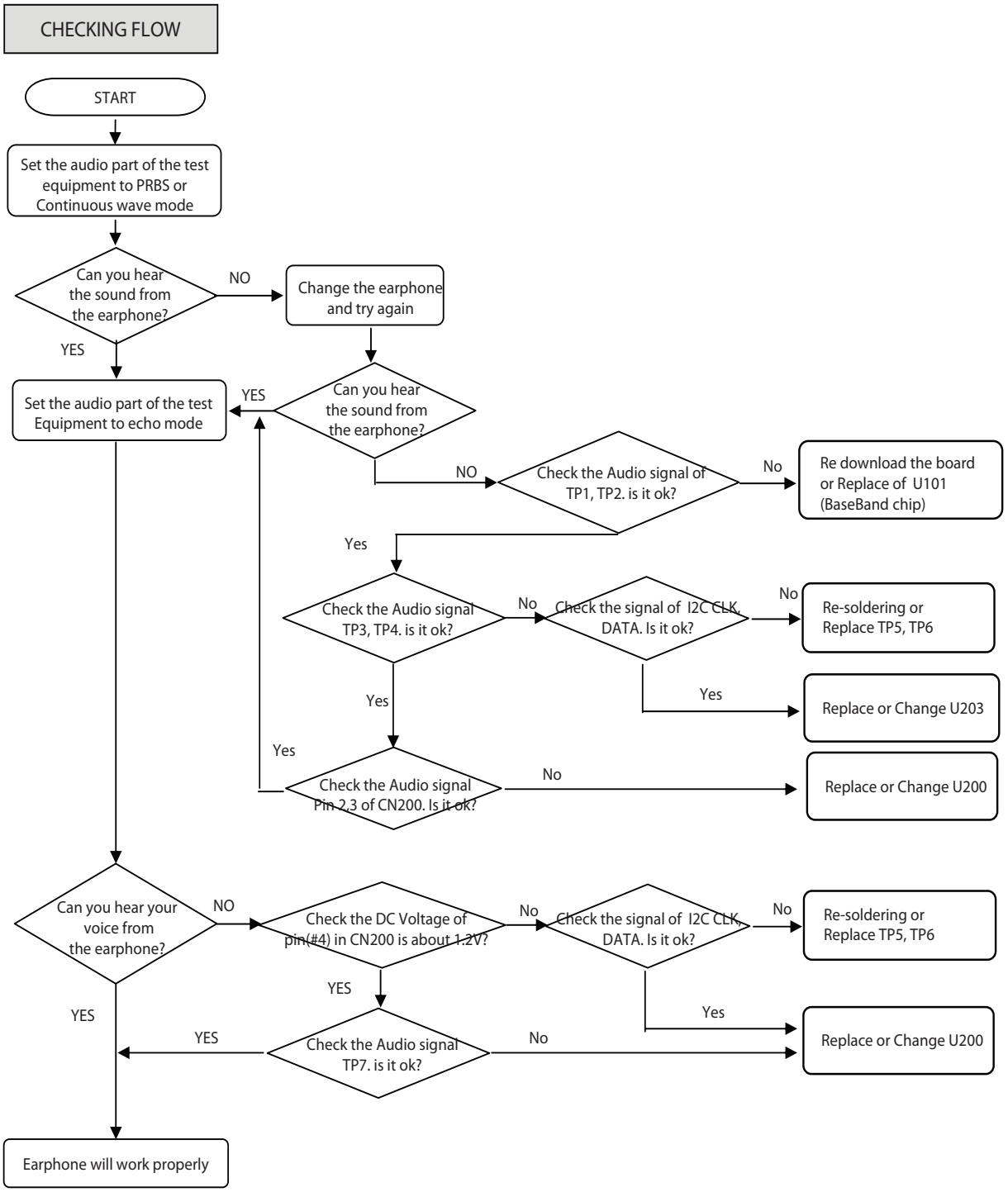



**Figure 4.11.3**



## 4.12 Receiver Trouble

TEST POINT

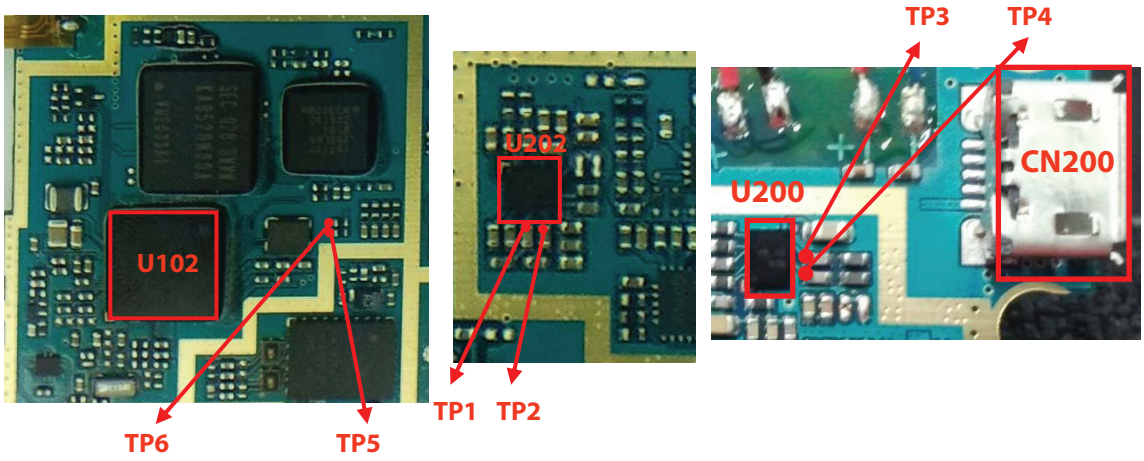



**Figure 4.12.1**

CIRCUIT

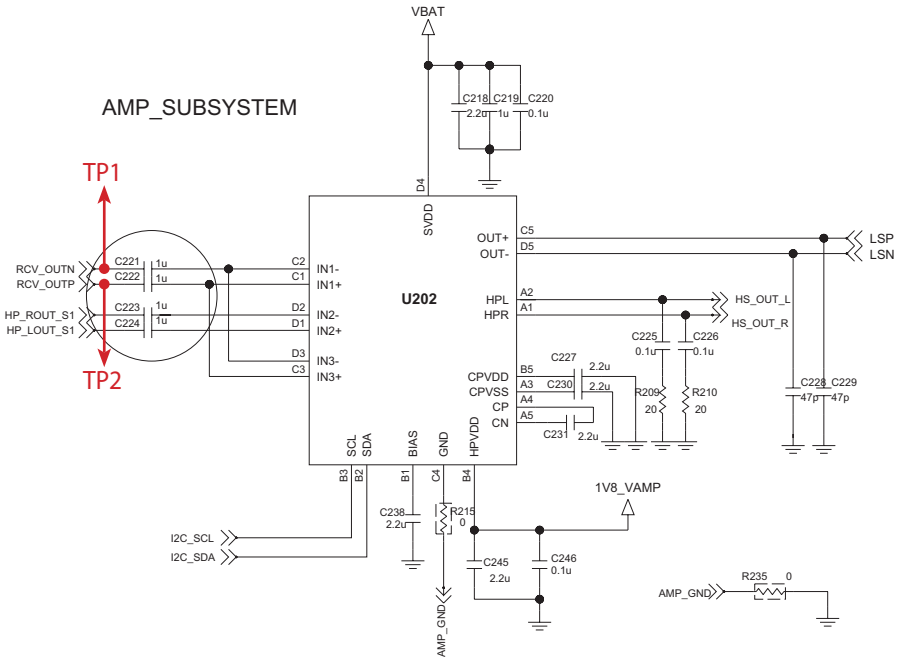



**Figure 4.12.2**

CIRCUIT

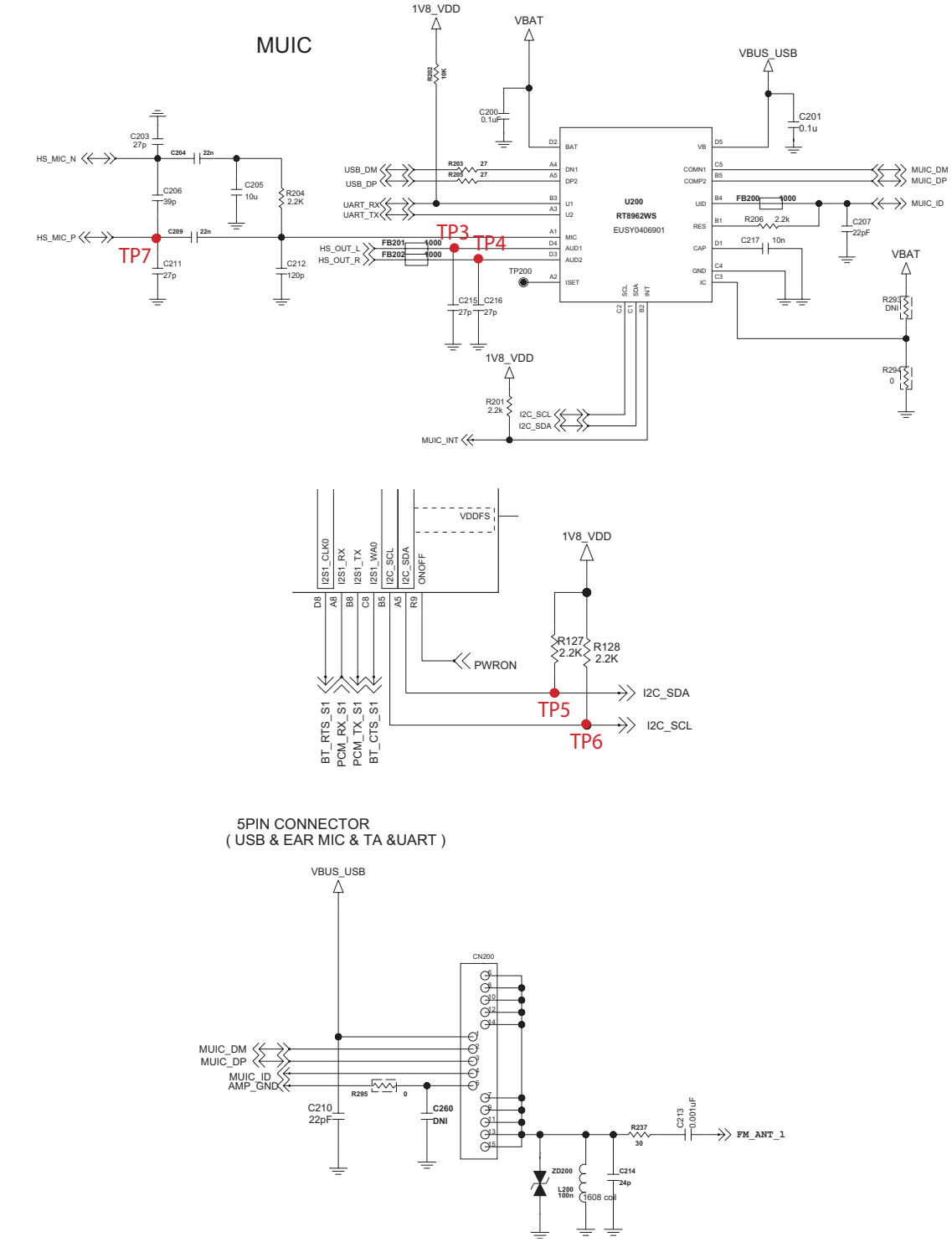
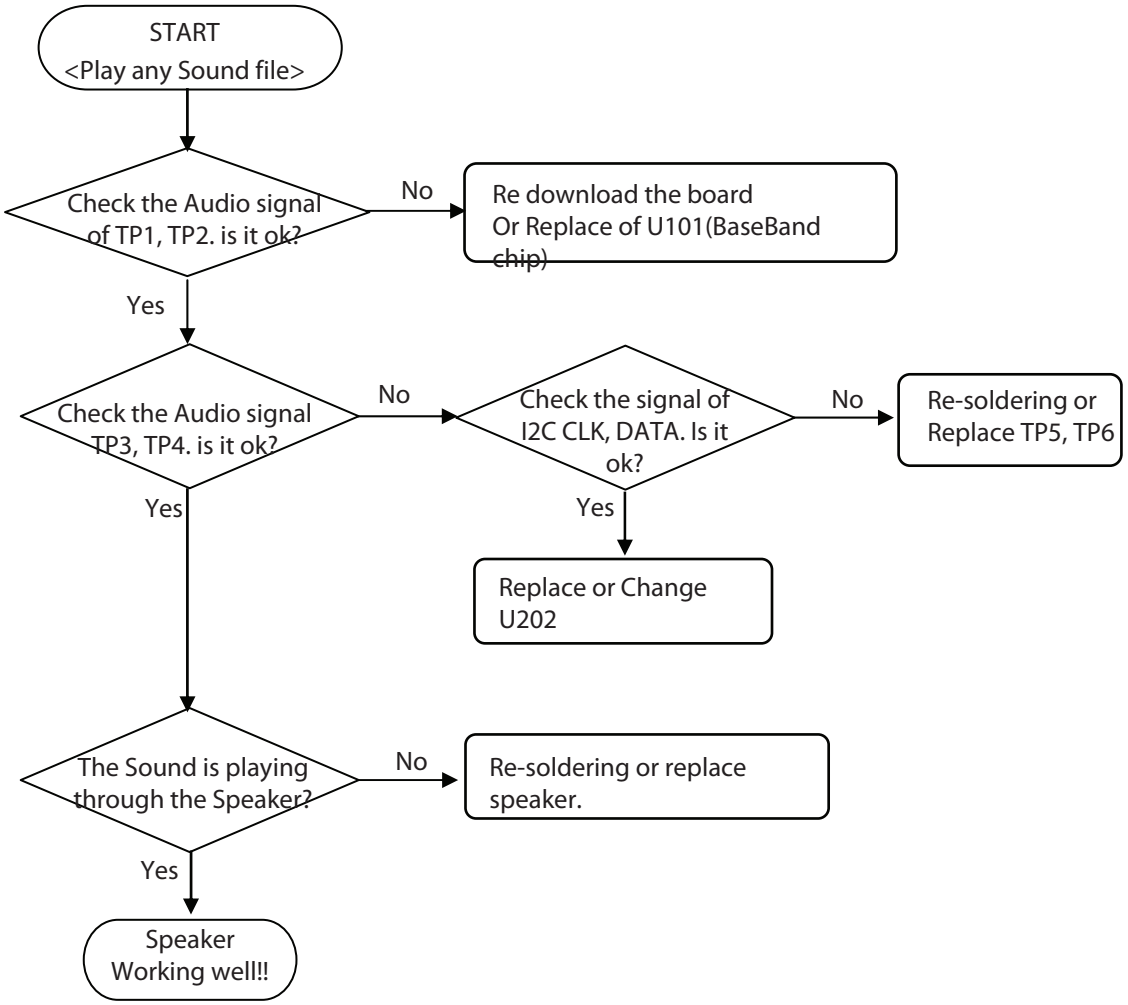



**Figure 4.12.3**

CHECKING FLOW



## 4.13 Microphone Trouble

TEST POINT

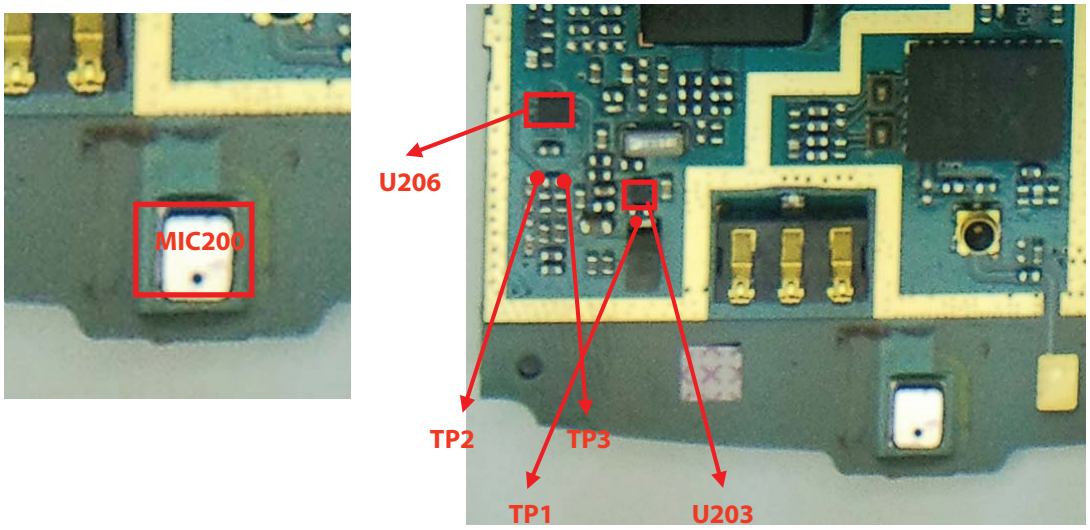



**Figure 4.13.1**

CIRCUIT

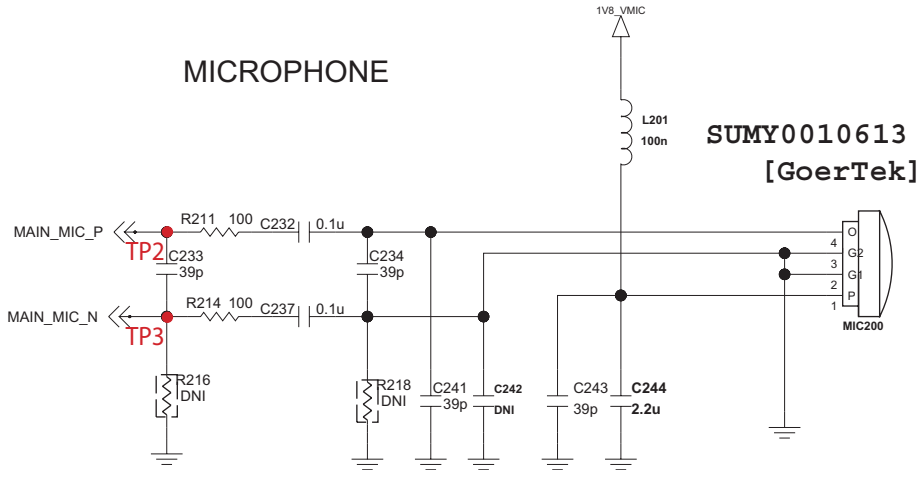
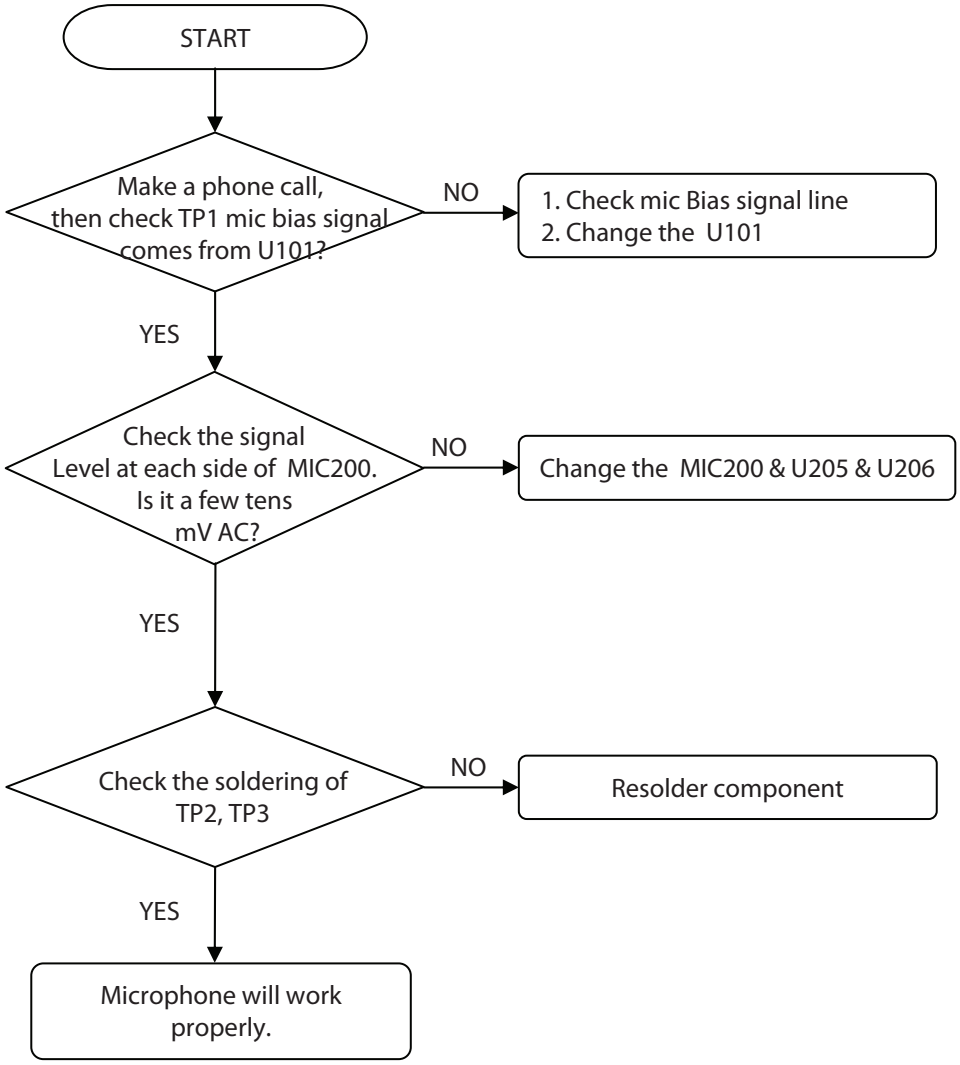



**Figure 4.13.2**

CHECKING FLOW

SETTING : After initialize Agilent 8960, Test EGSM900, DCS mode ( or PCS mode )



## 4.14 SIM Card Interface Trouble

TEST POINT

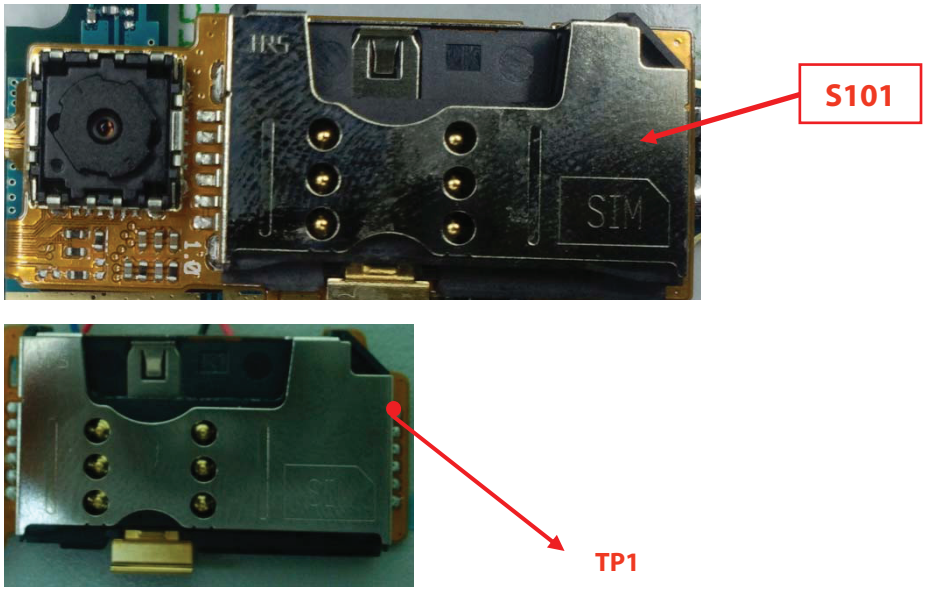



**Figure 4.14.1**

CIRCUIT

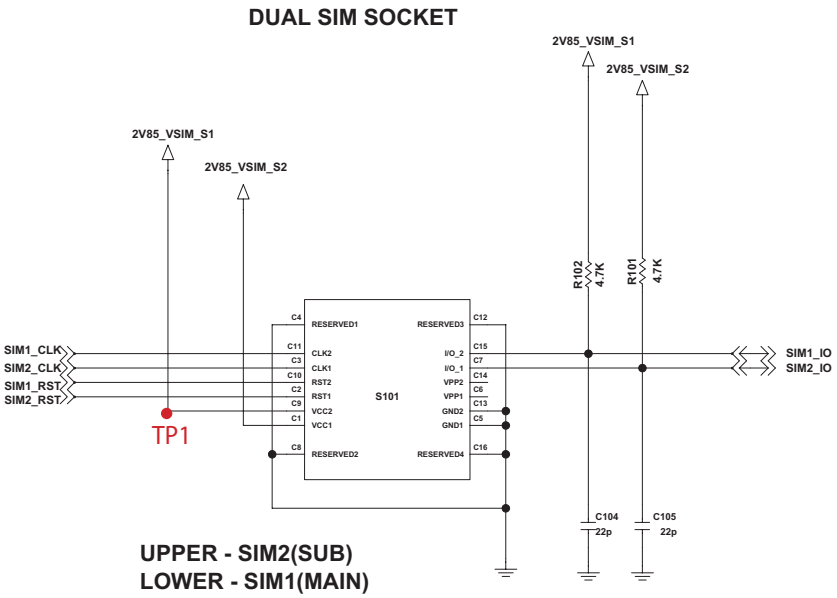
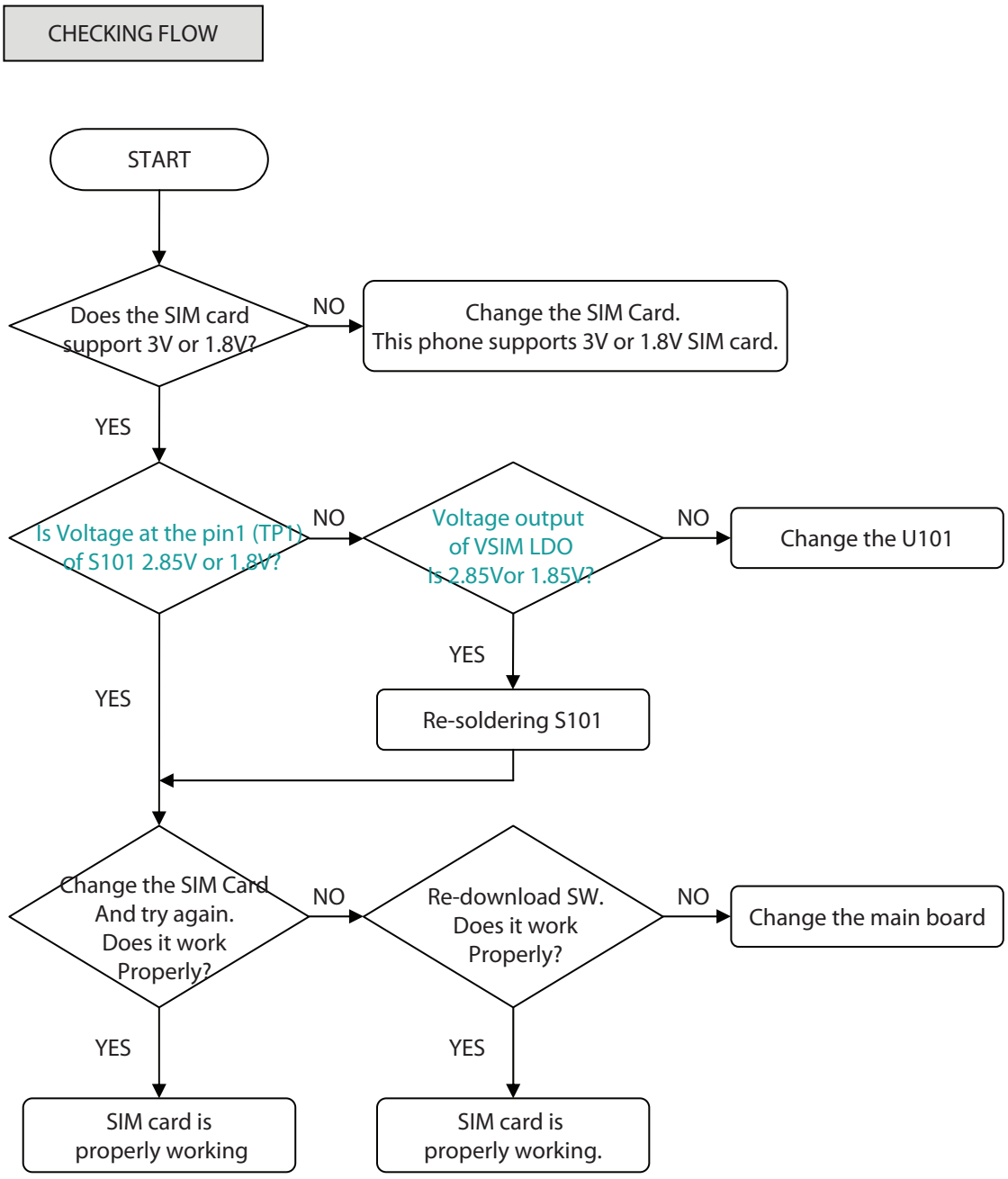



**Figure 4.14.2**



## 4.15 Micro SD Trouble

TEST POINT

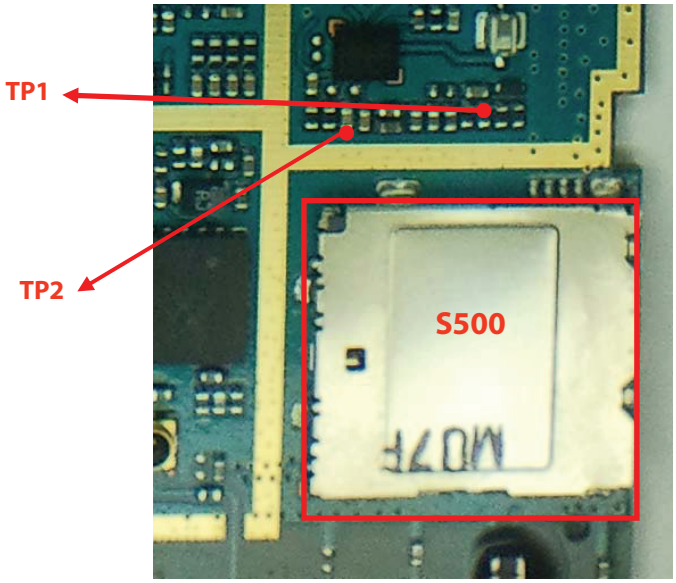



**Figure 4.16.1**

CIRCUIT

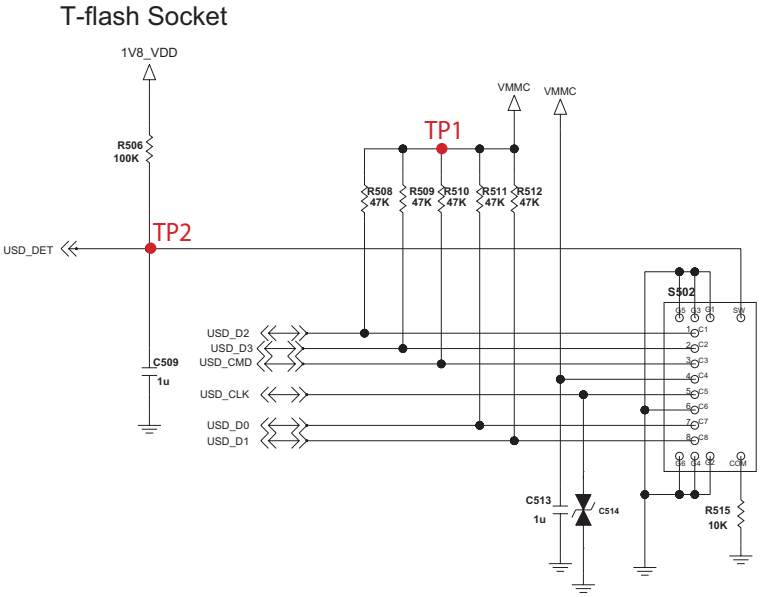
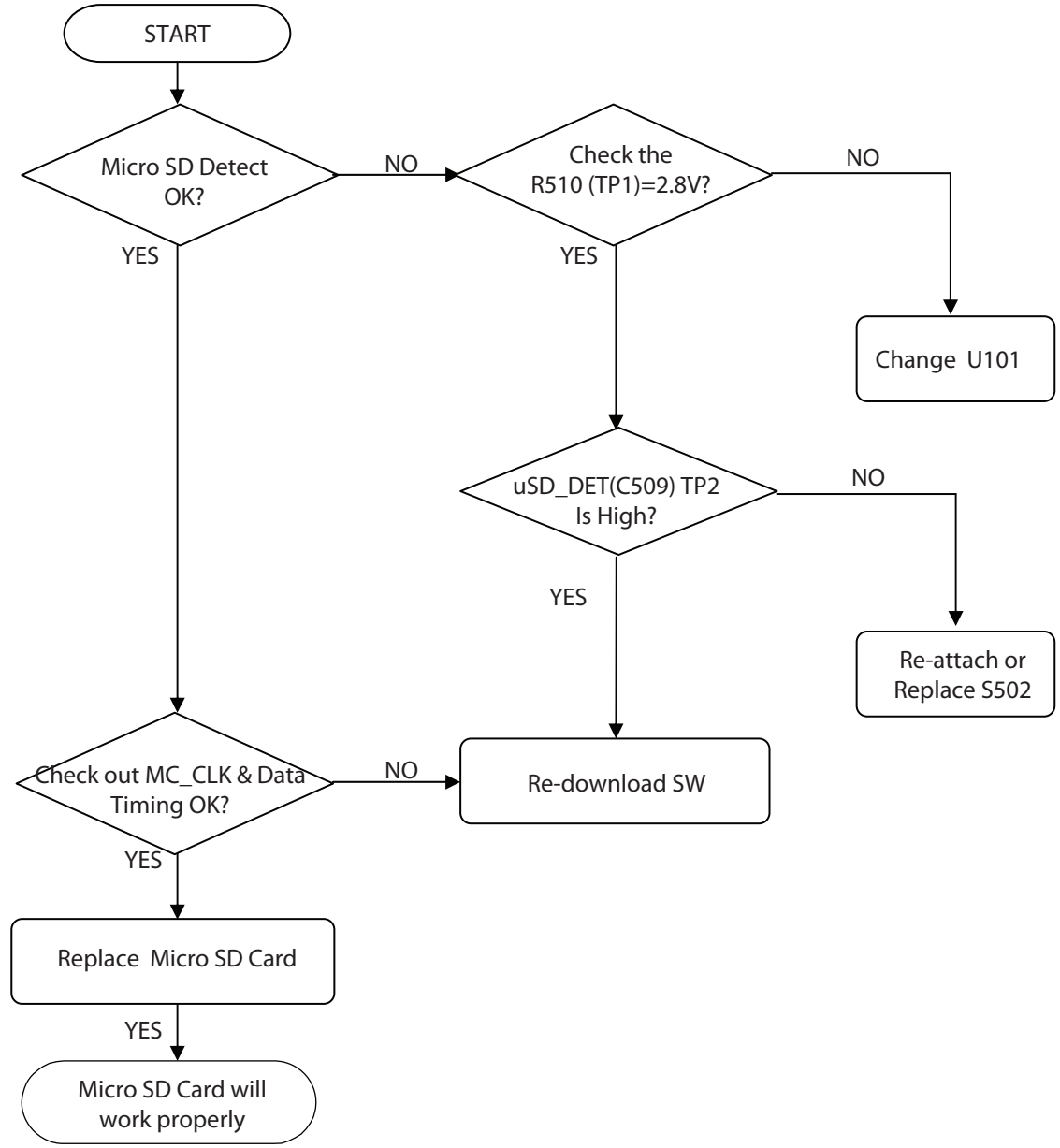



**Figure 4.16.2**

CHECKING FLOW



## 4.16 Bluetooth Trouble

TEST POINT

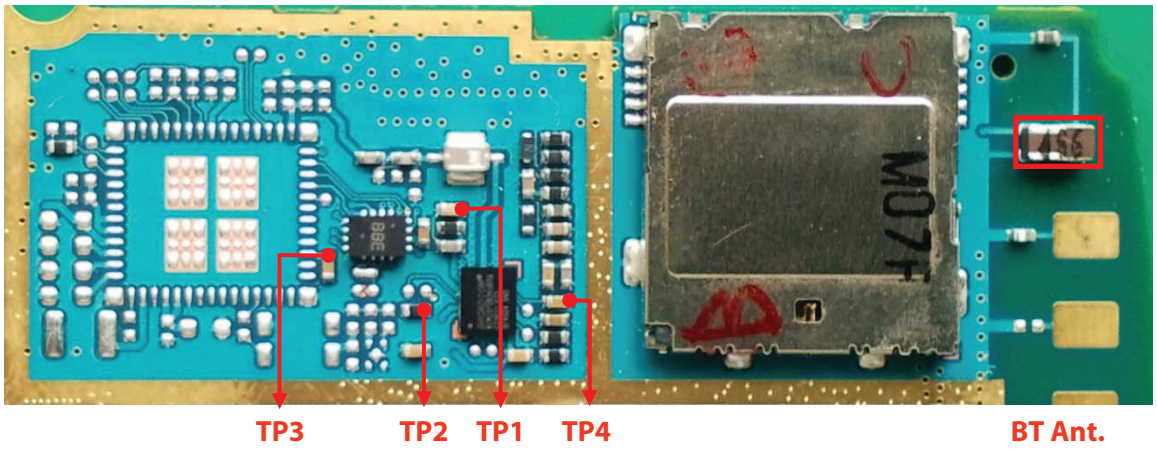



**Figure 4.17.1 Bluetooth block**

CIRCUIT

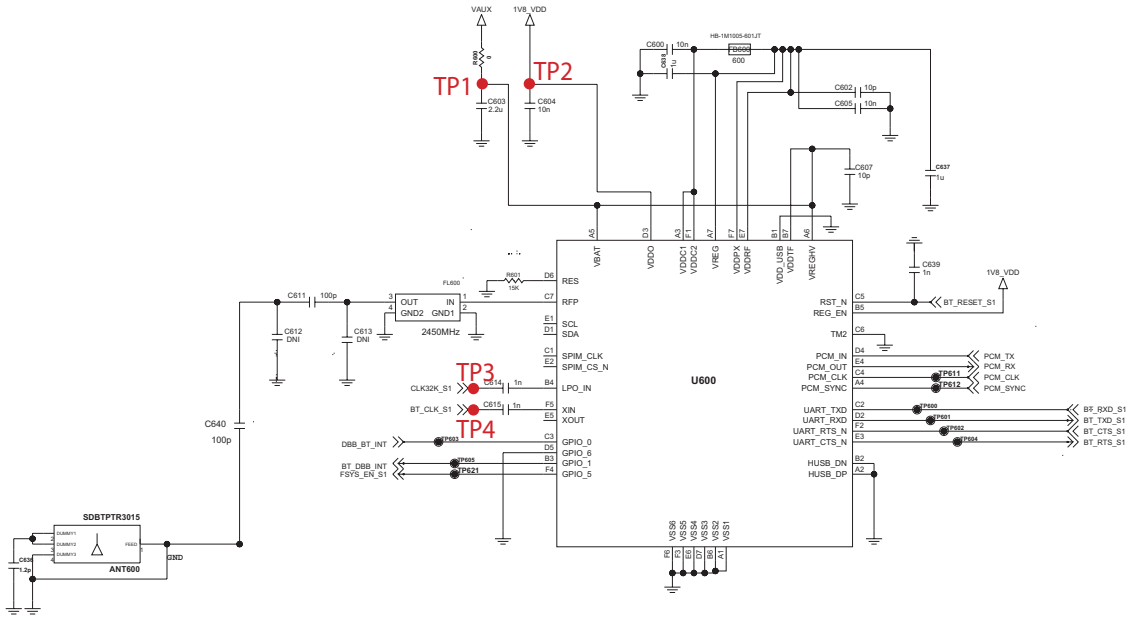
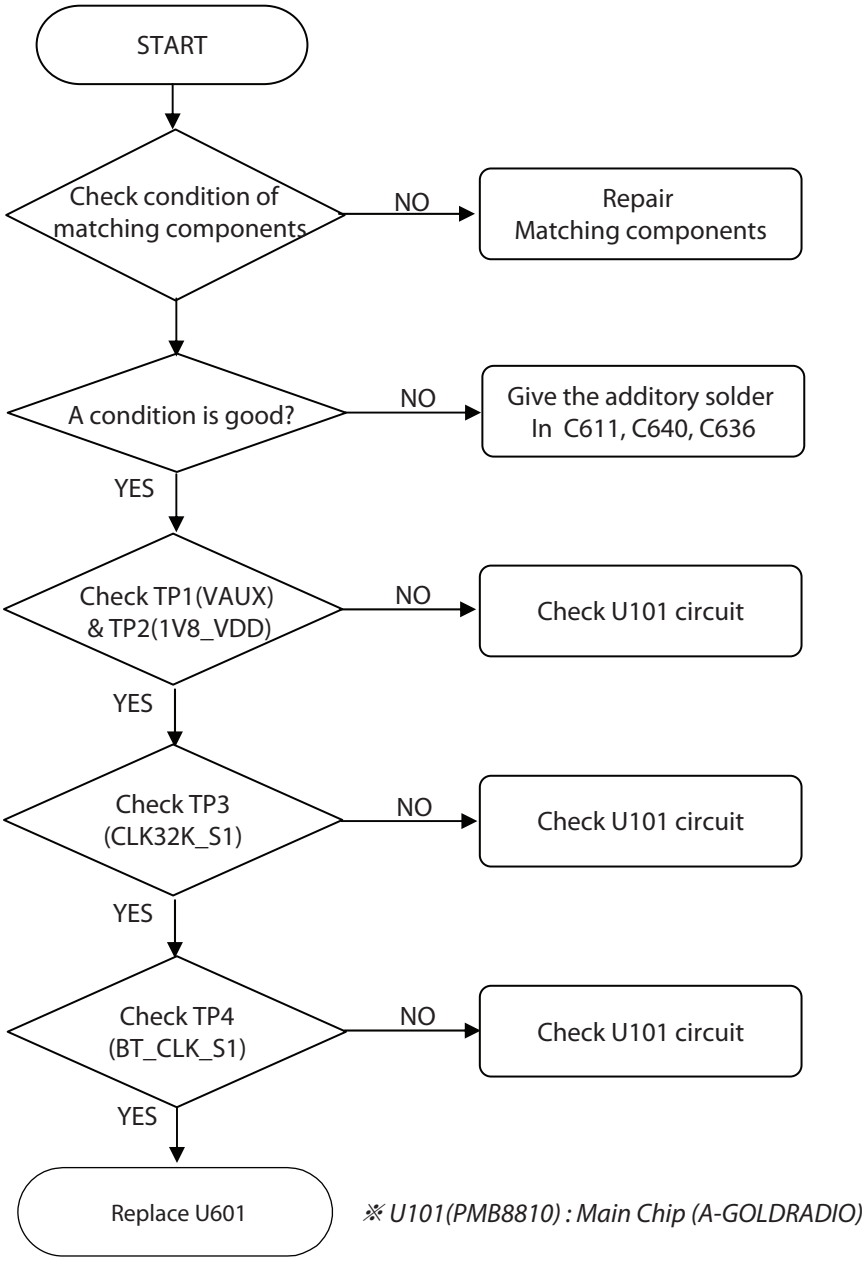



**Figure 4.17.2 Bluetooth circuit**

CHECKING FLOW




※ *U101(PMB8810) : Main Chip (A-GOLDRADIO)*

## 4.17 FM Radio Trouble

TEST POINT

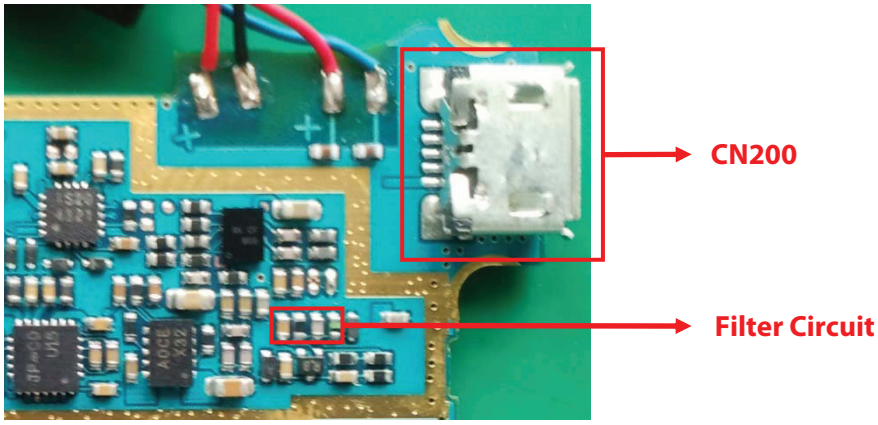



**Figure 4.18.1 FM Radio test point**

CIRCUIT

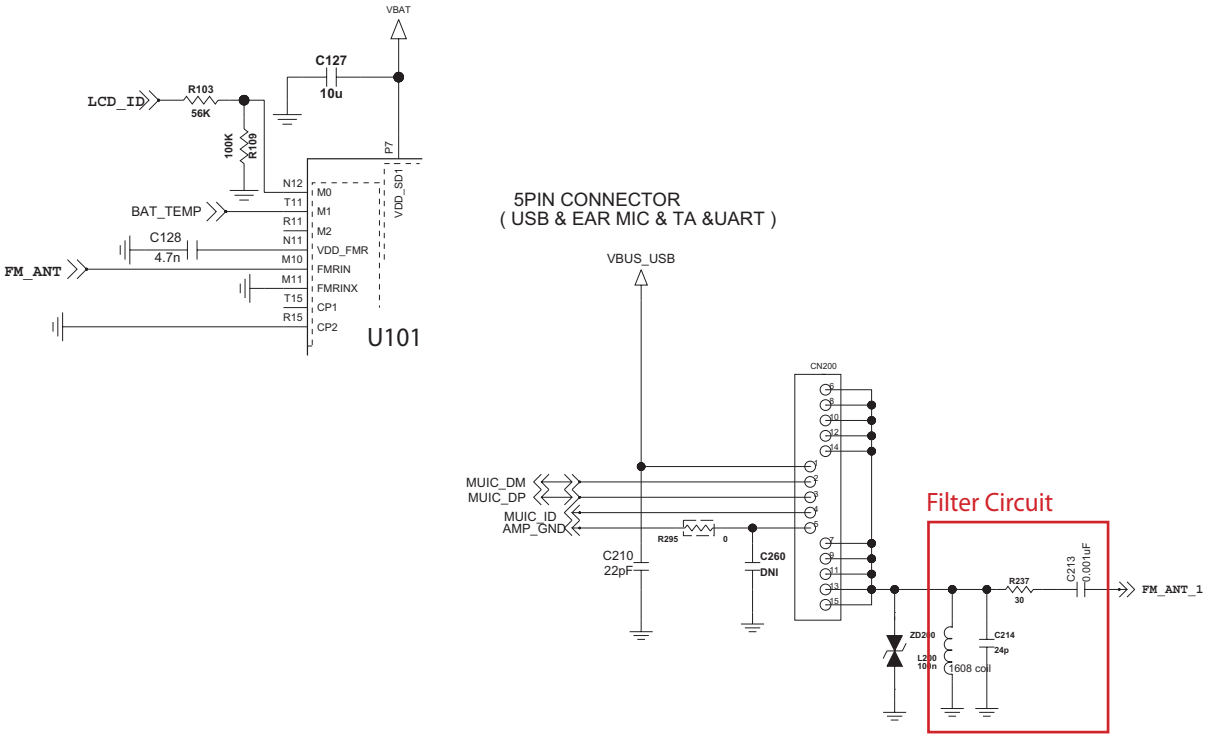
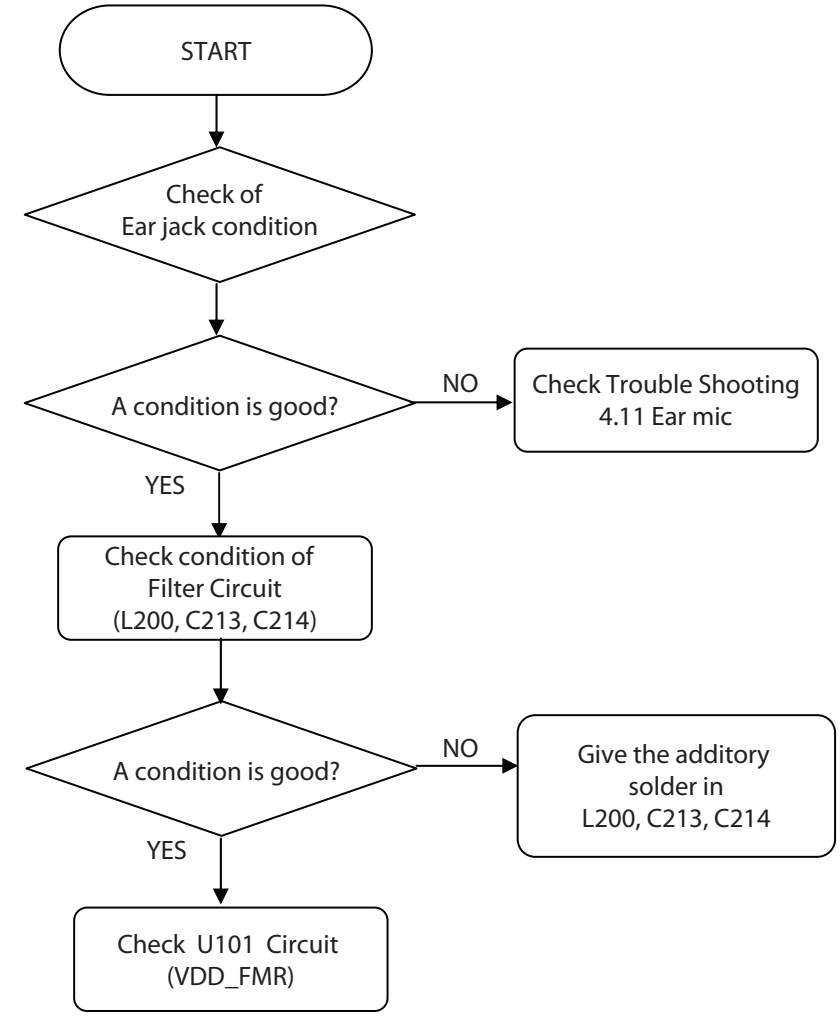
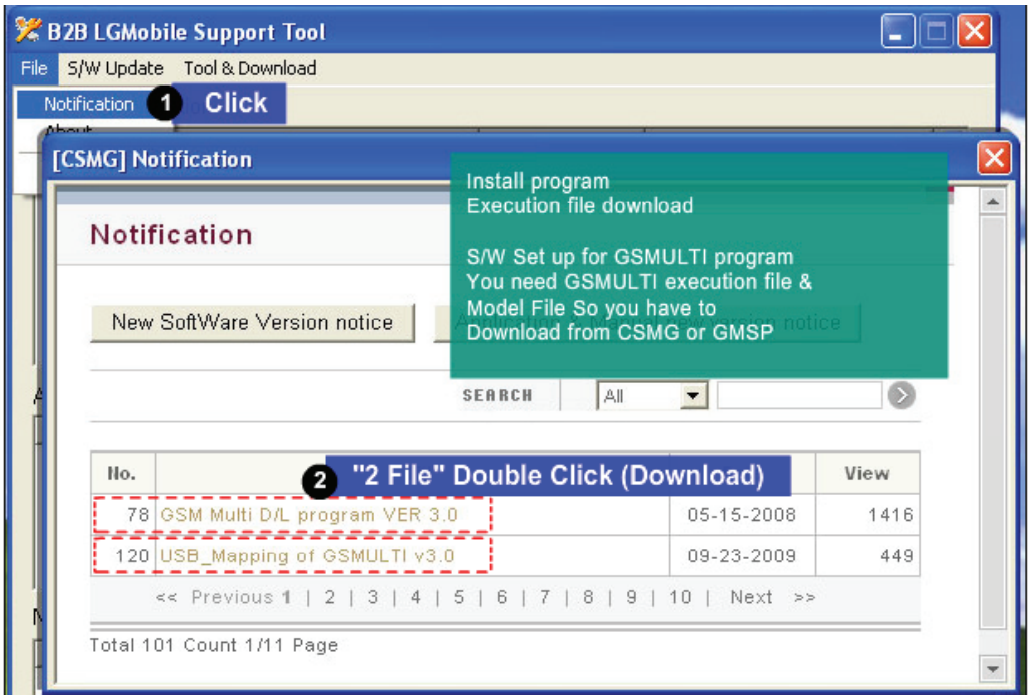


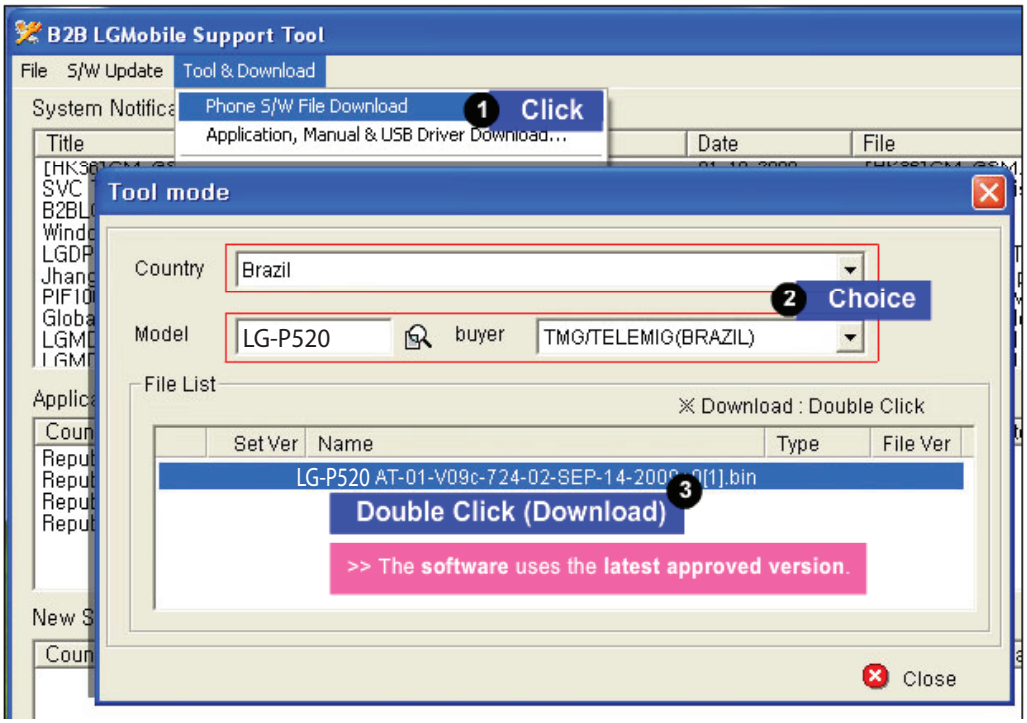

**Figure 4.18.2 FM Radio circuit**

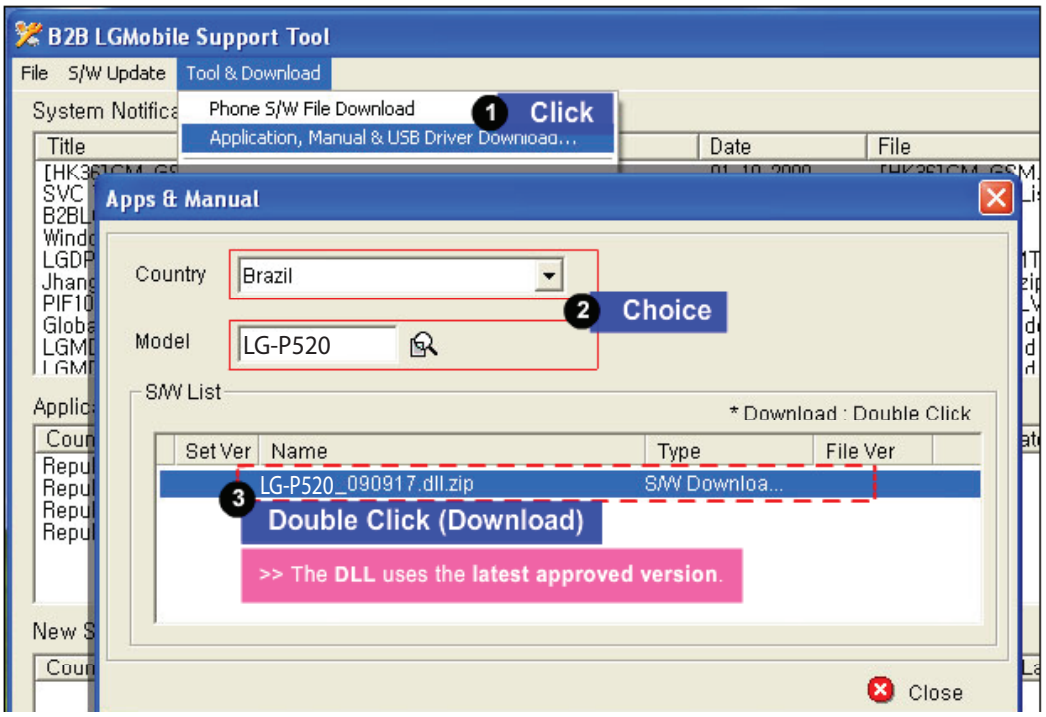
CHECKING FLOW

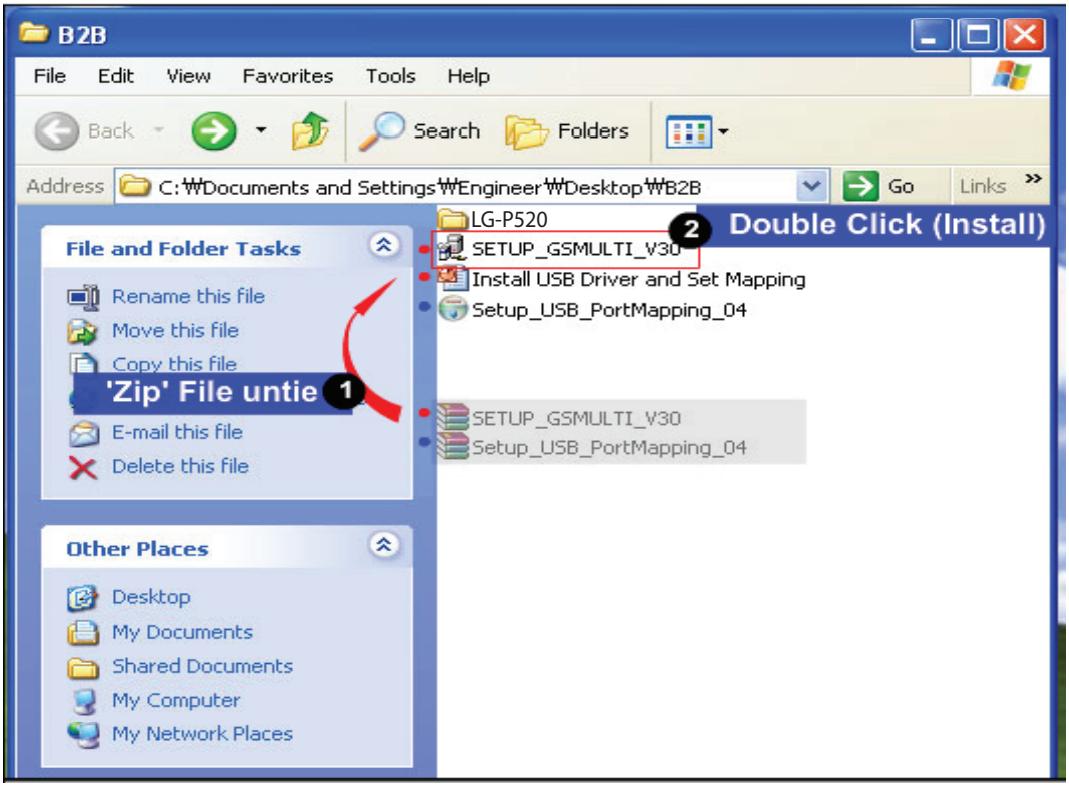


# 5. DOWNLOAD

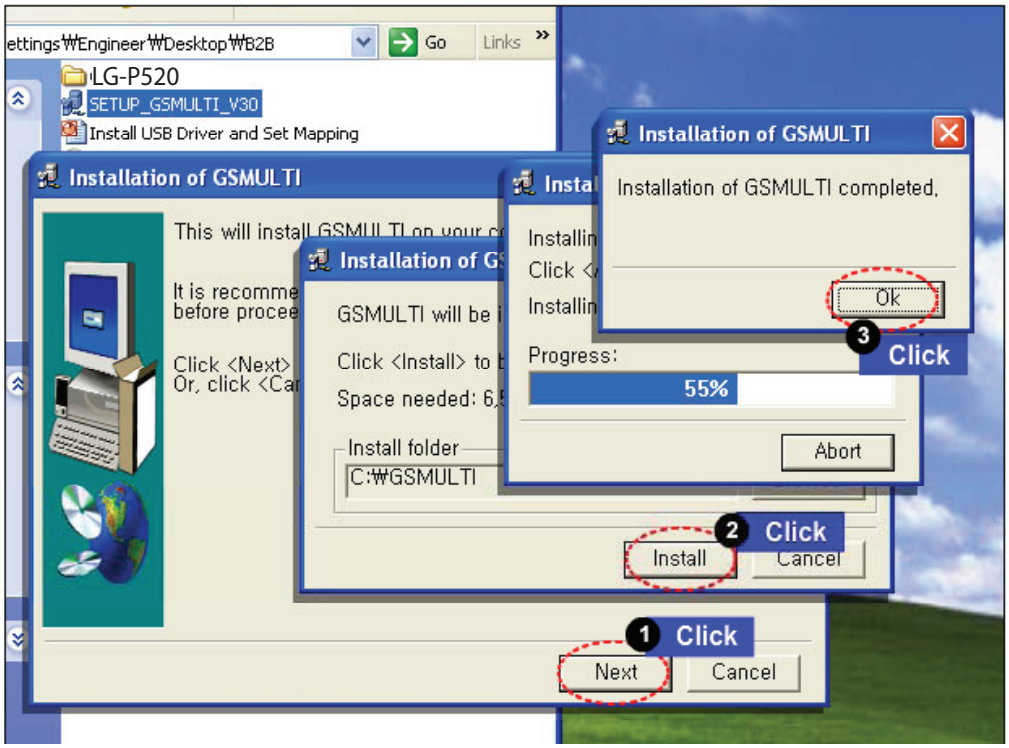


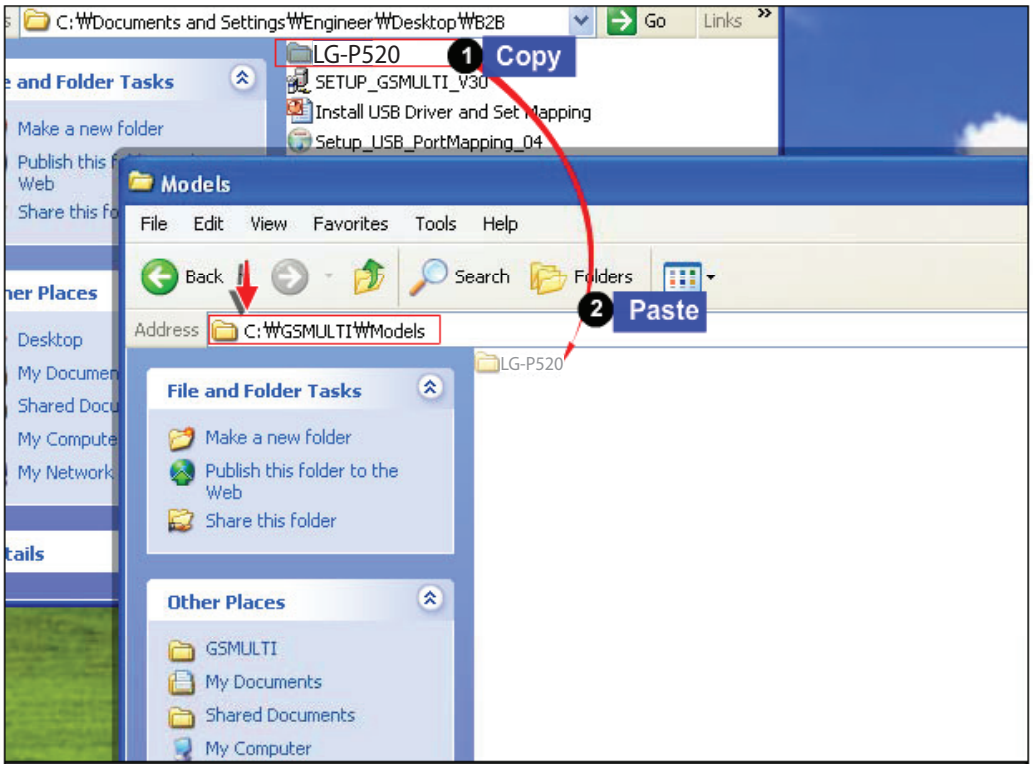



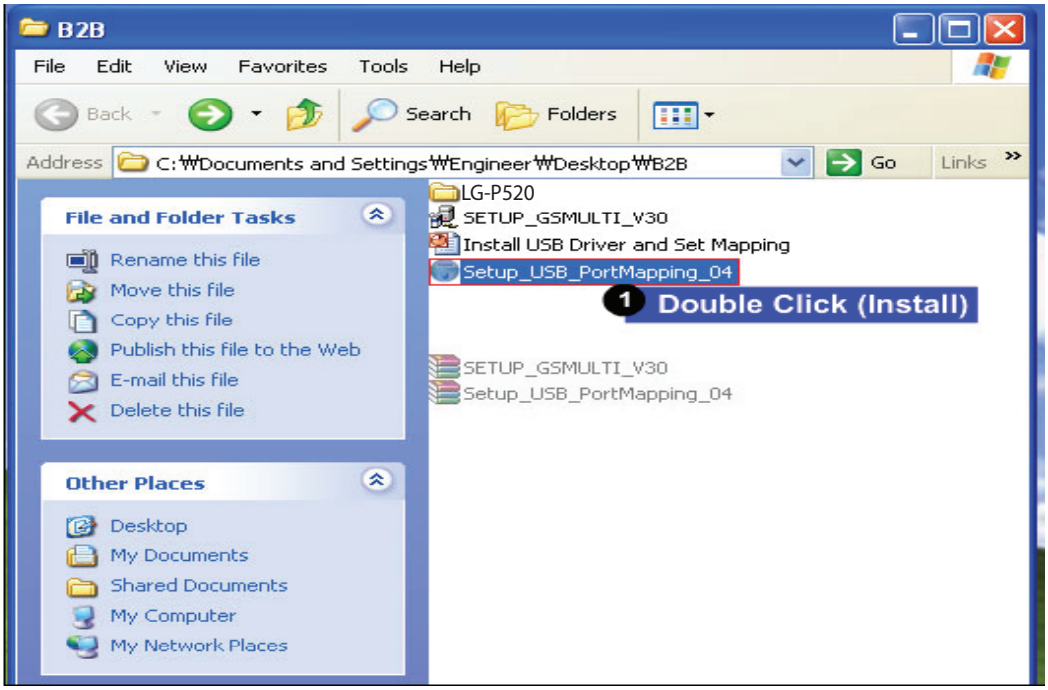


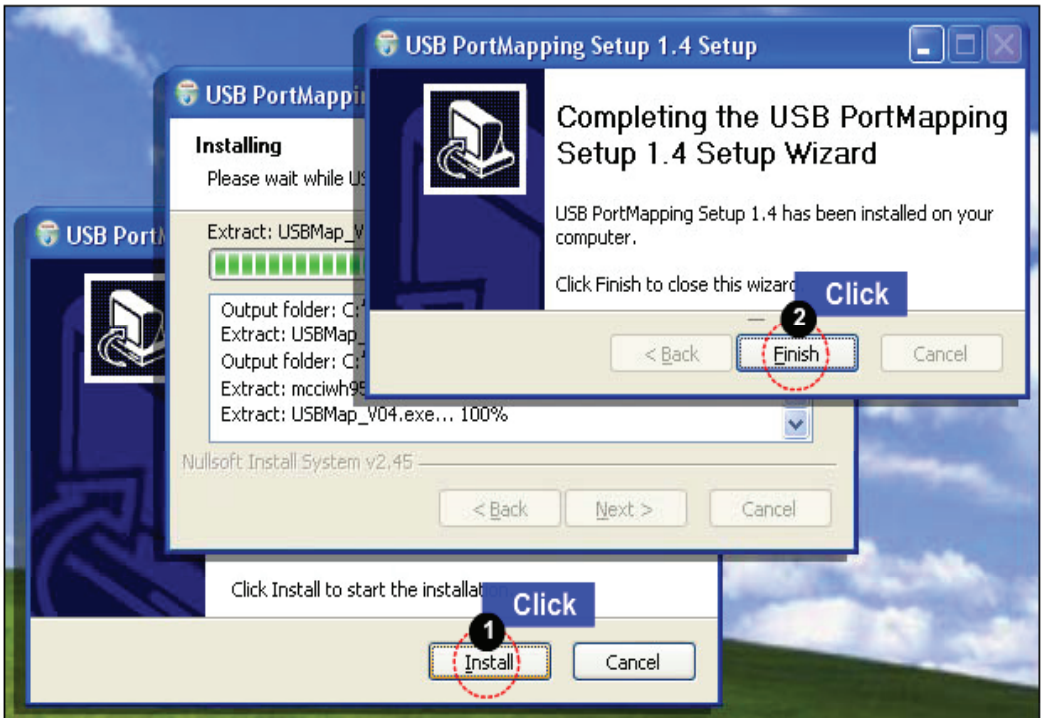



# 5. DOWNLOAD

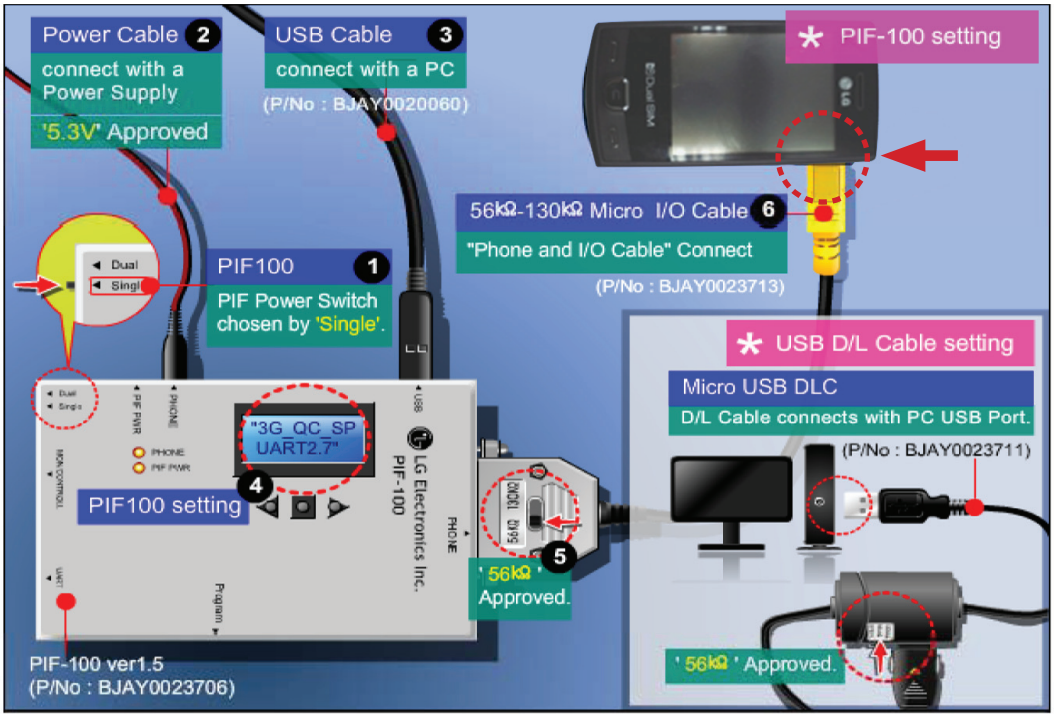


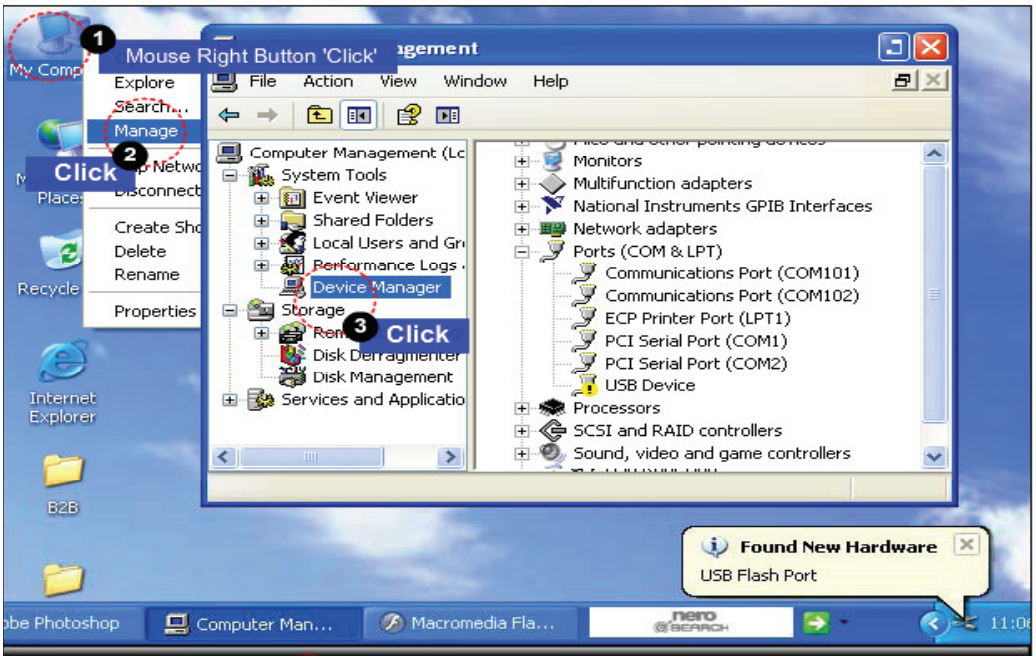



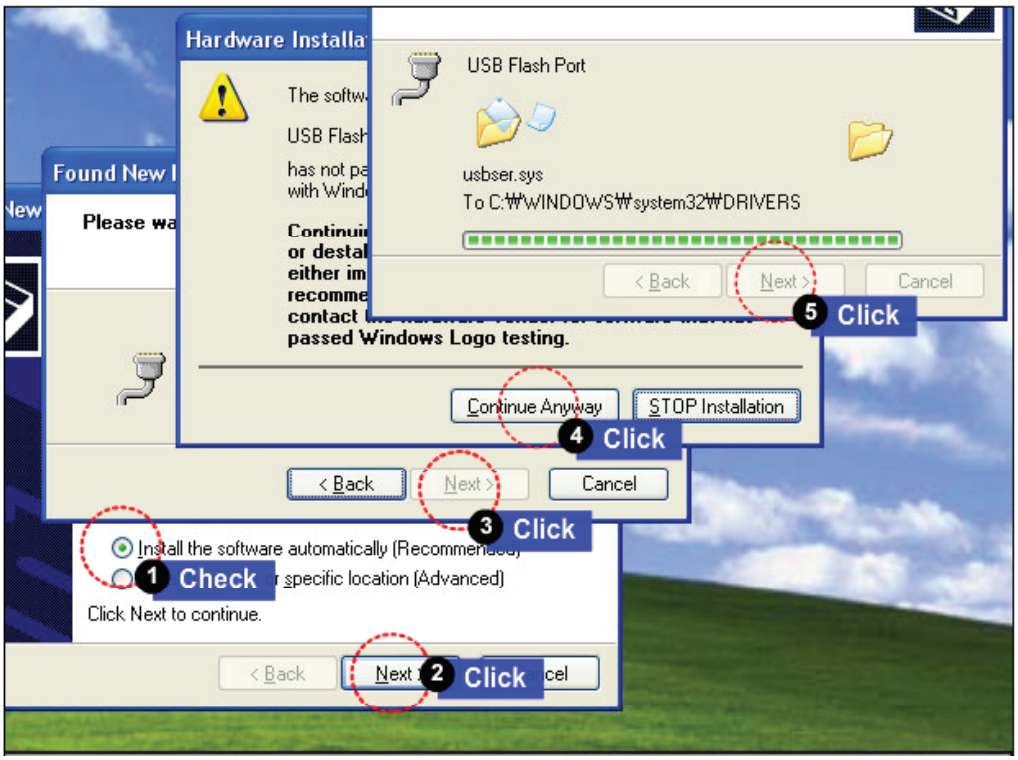


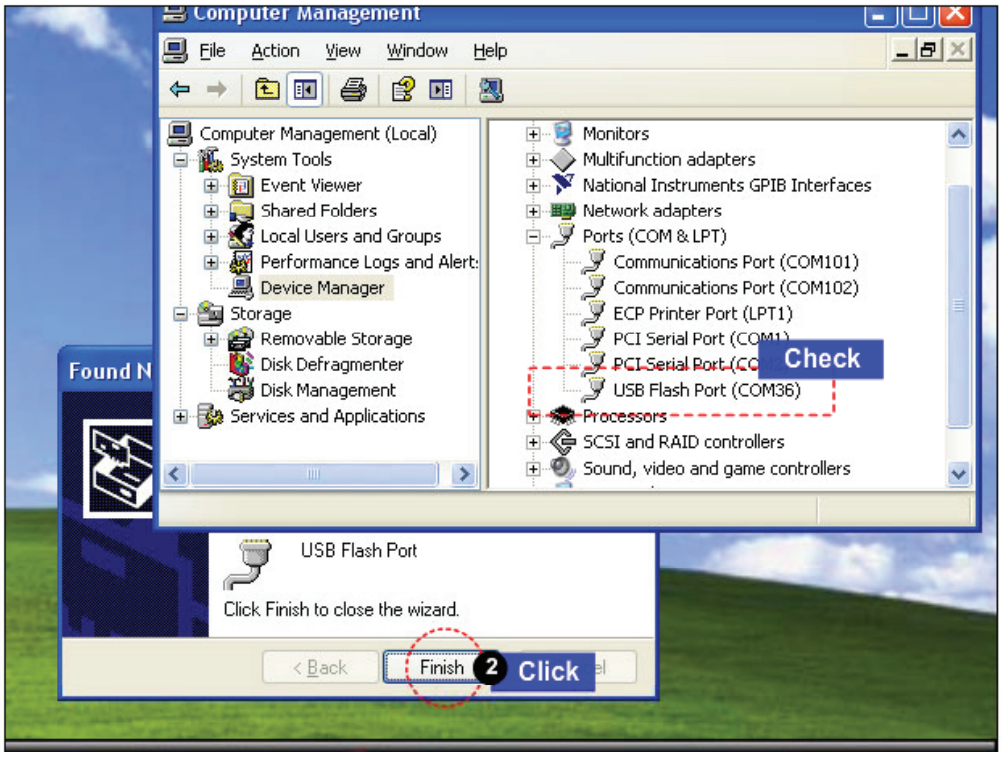



# 5. DOWNLOAD





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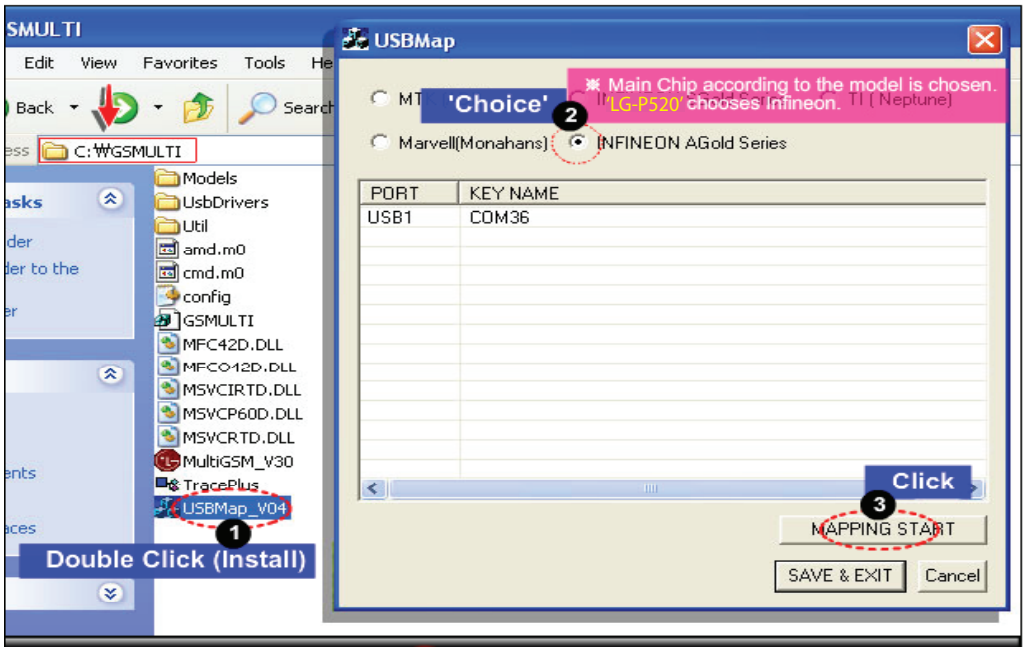


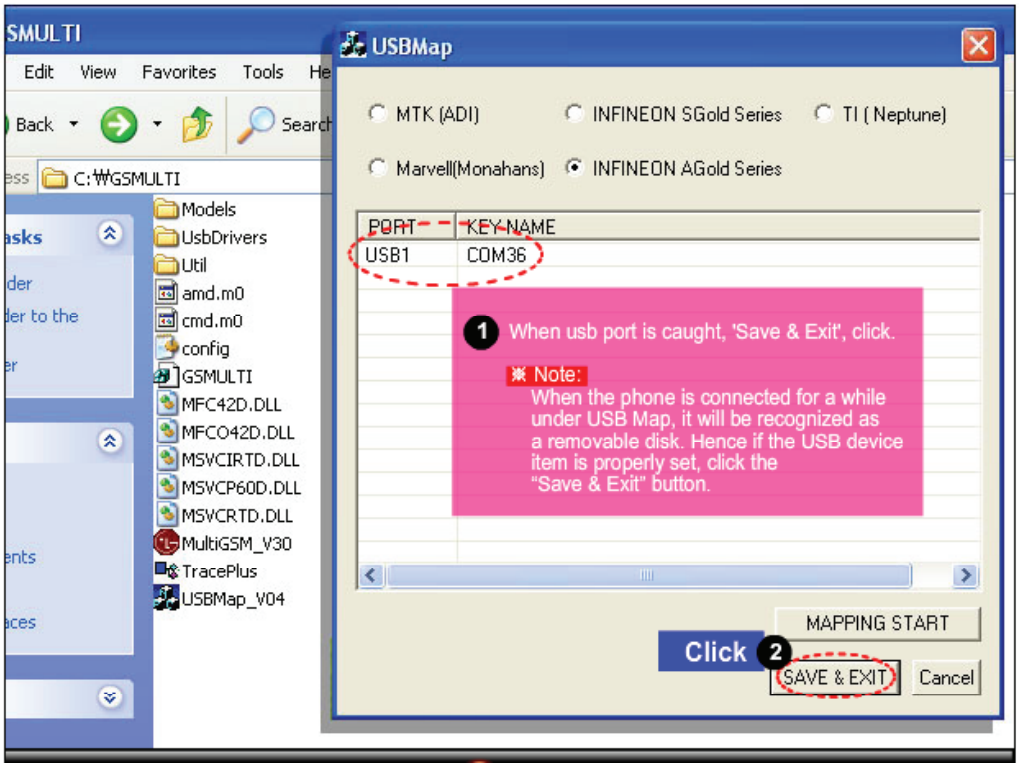

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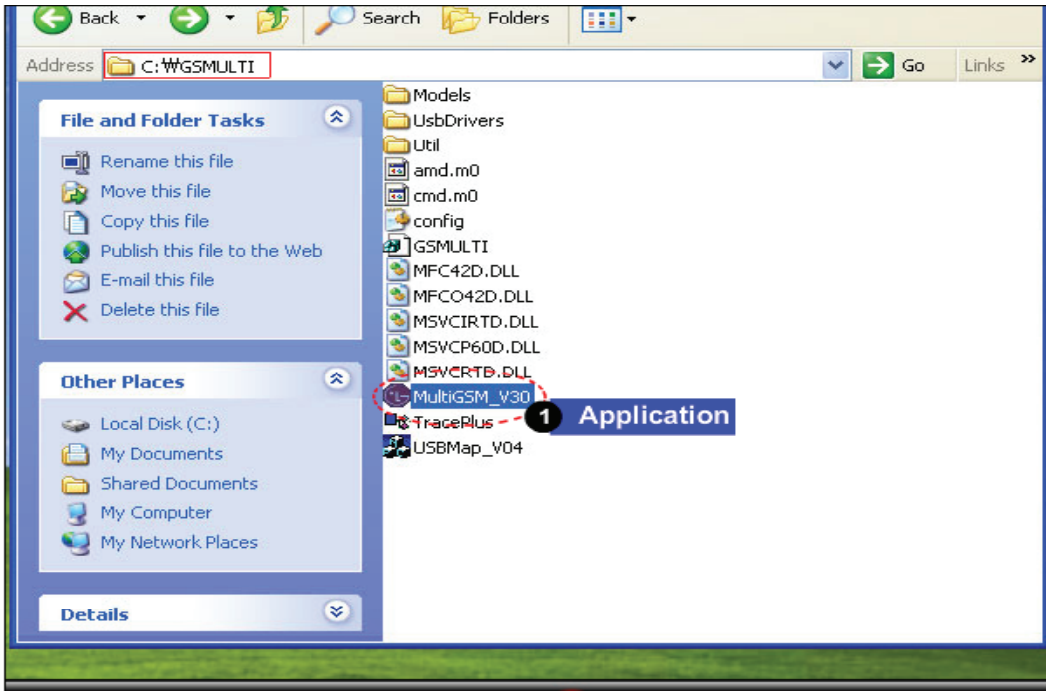
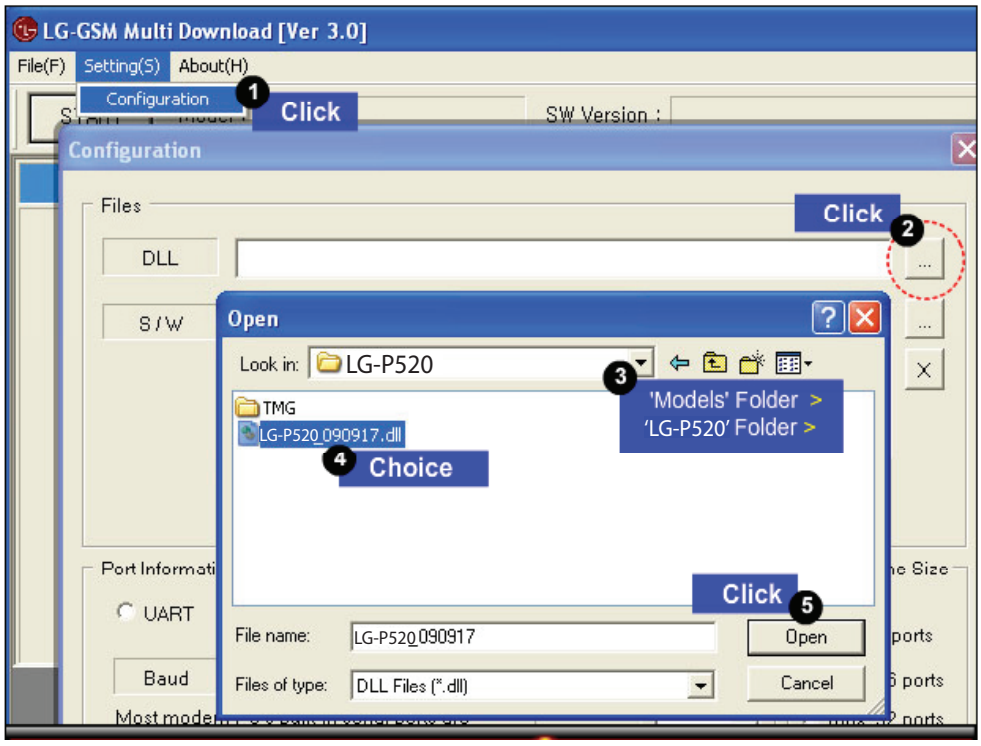
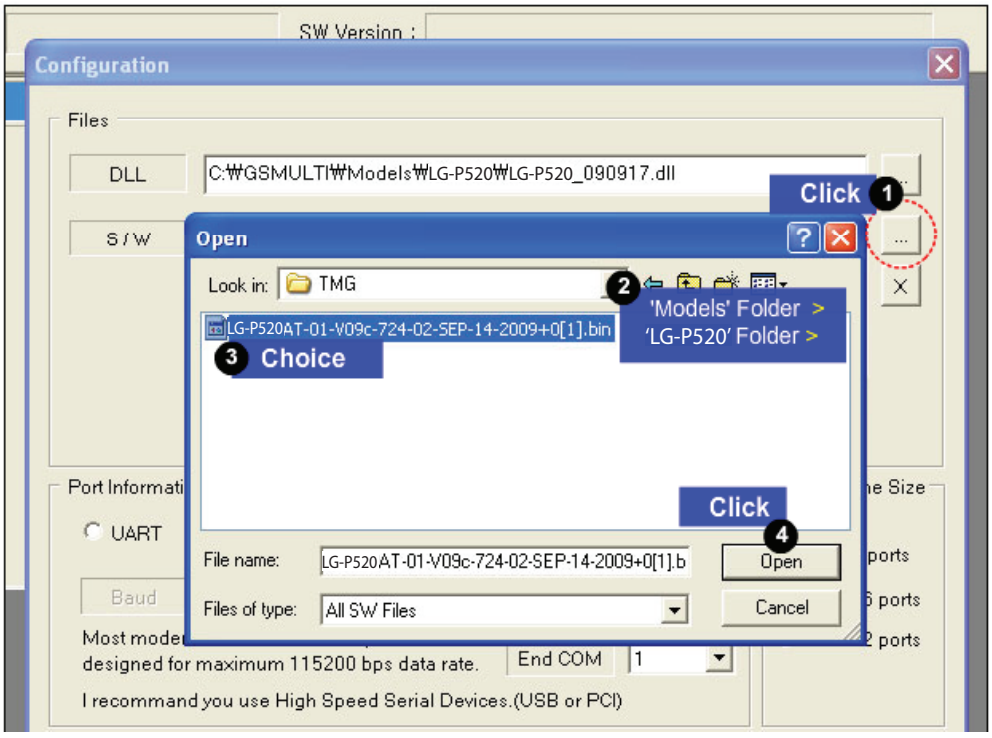
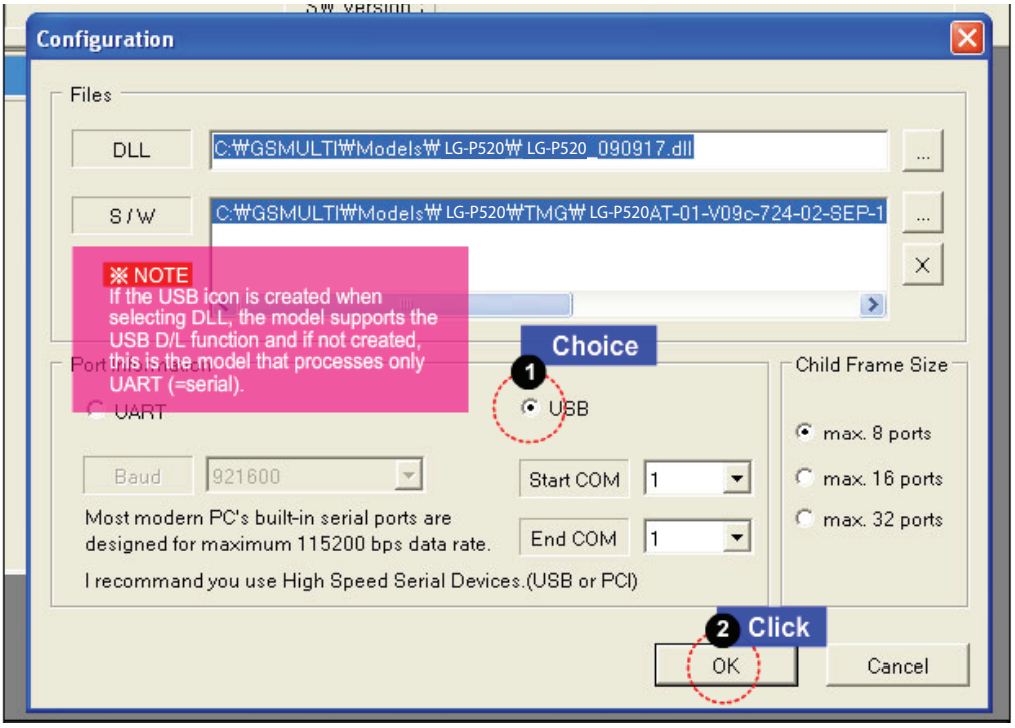
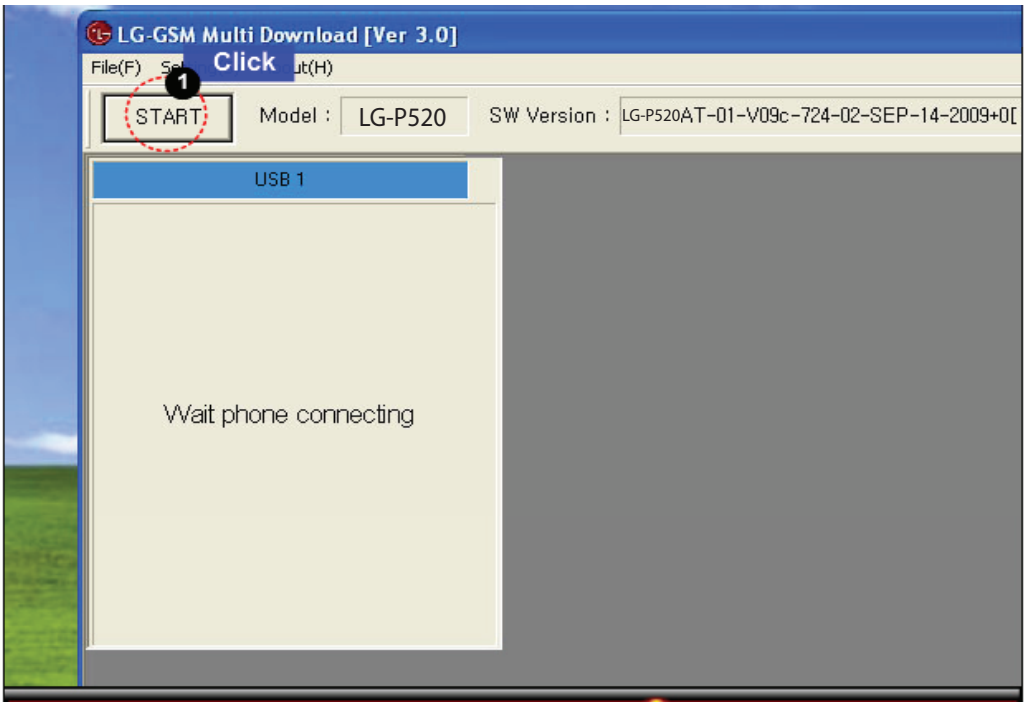


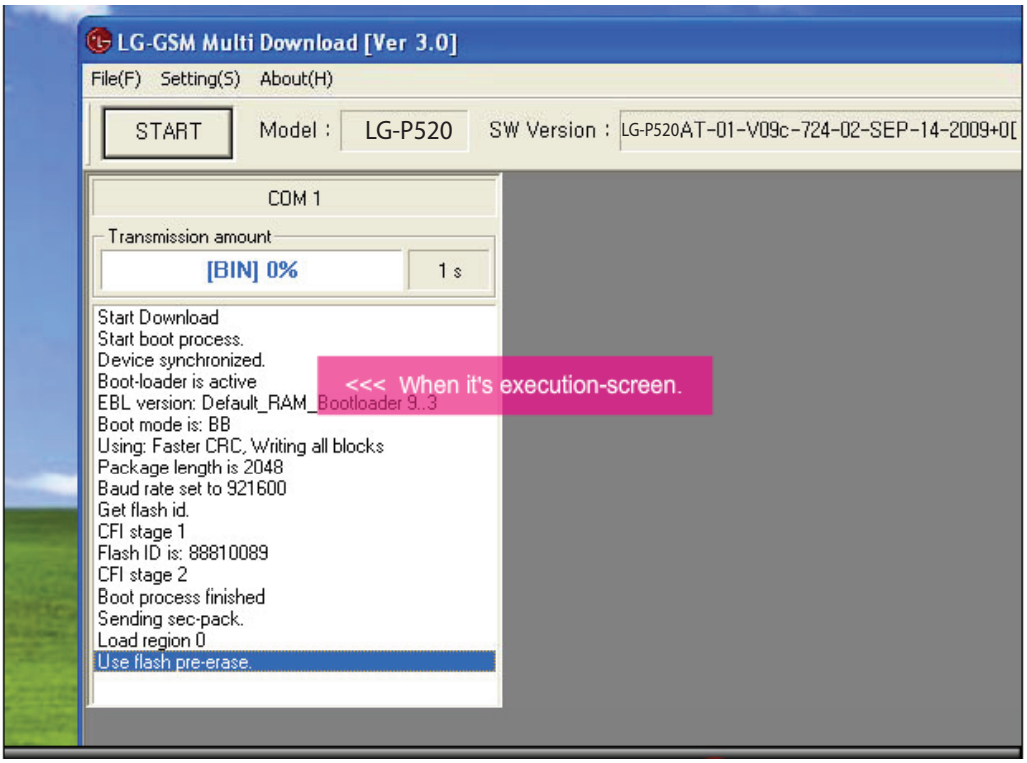


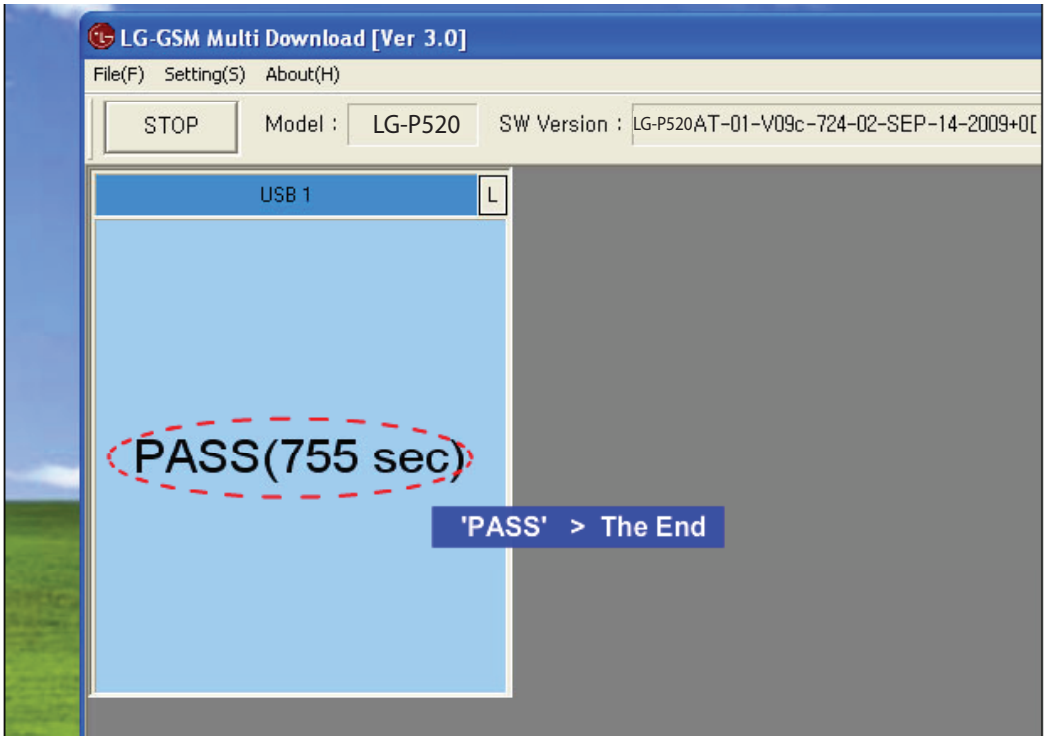
# 5. DOWNLOAD



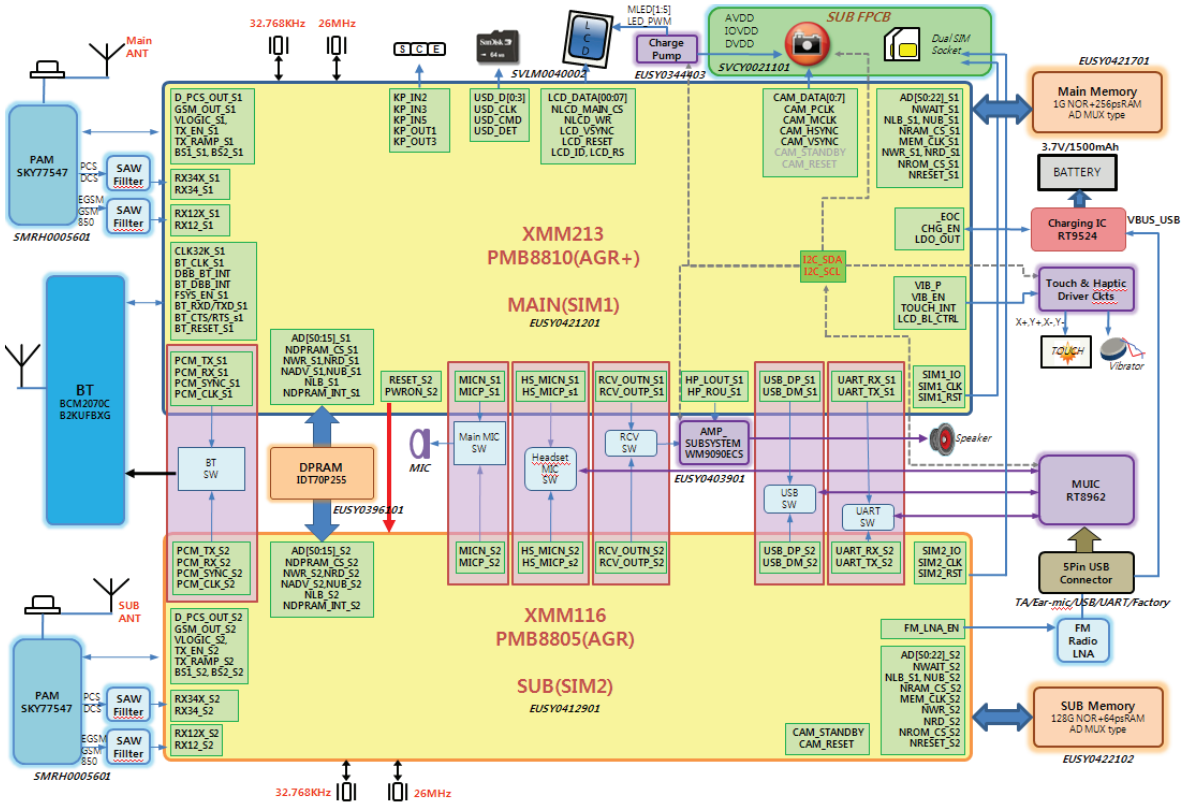



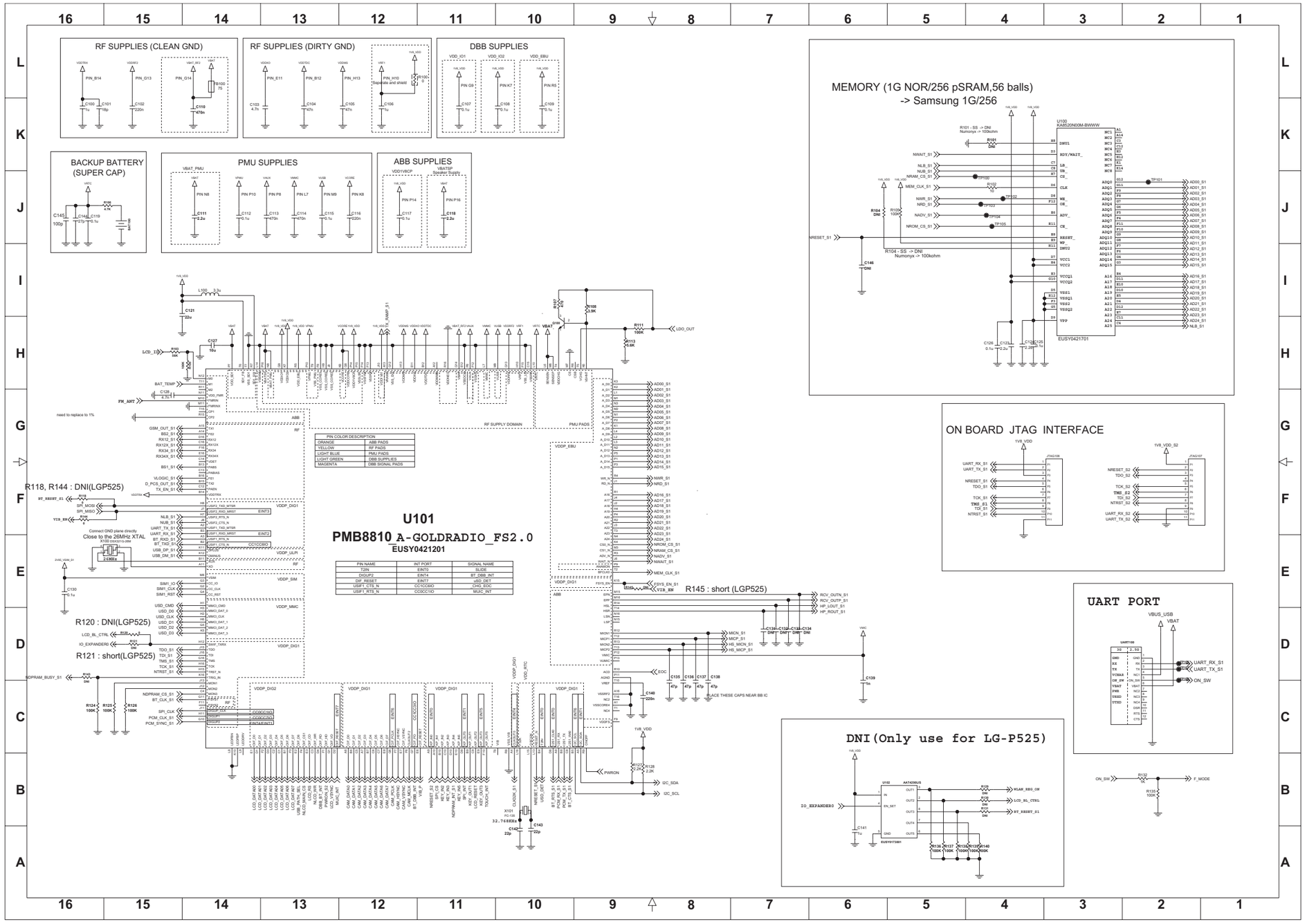
# 5. DOWNLOAD



# 6. BLOCK DIAGRAM



# 7. CIRCUIT DIAGRAM

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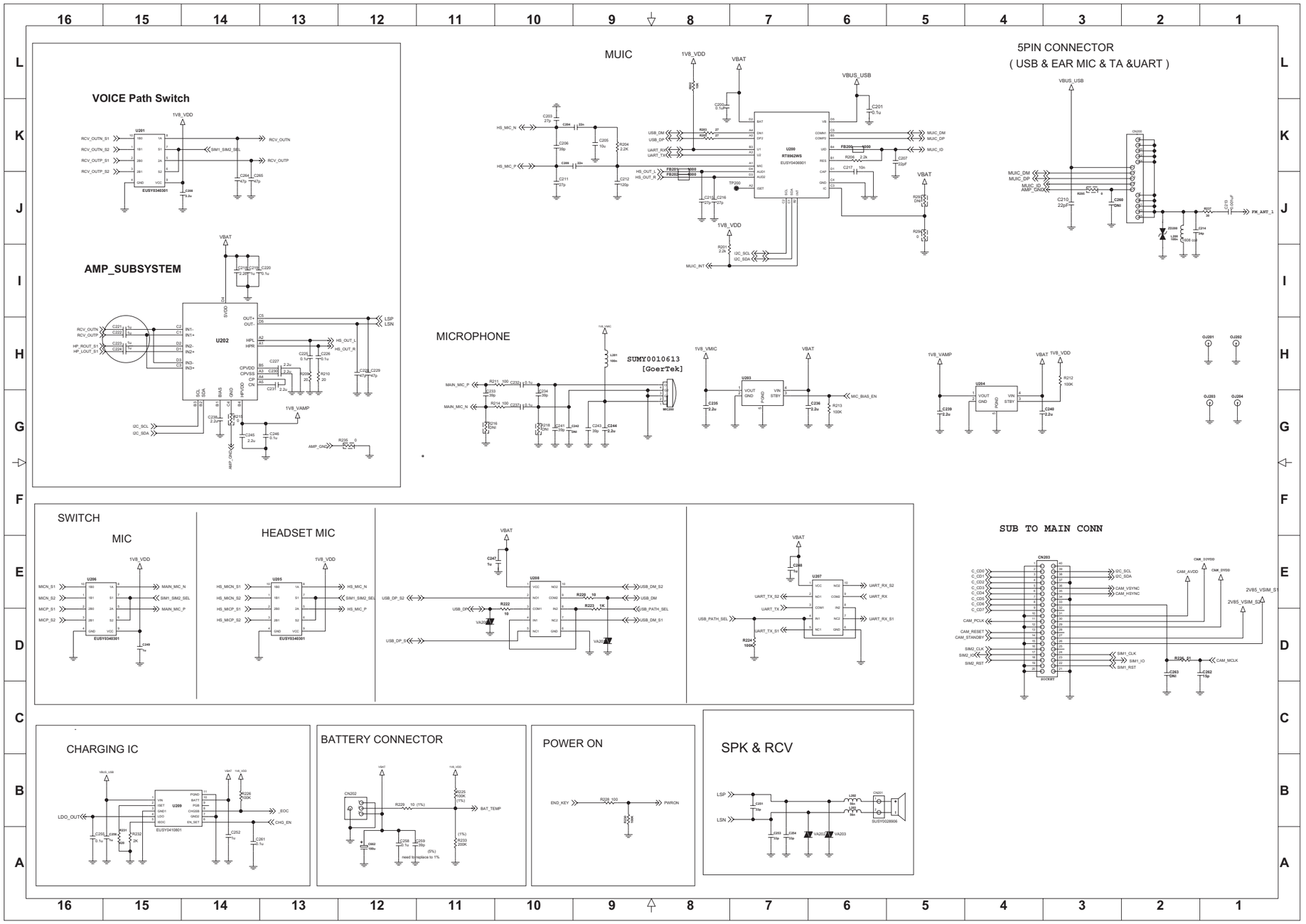
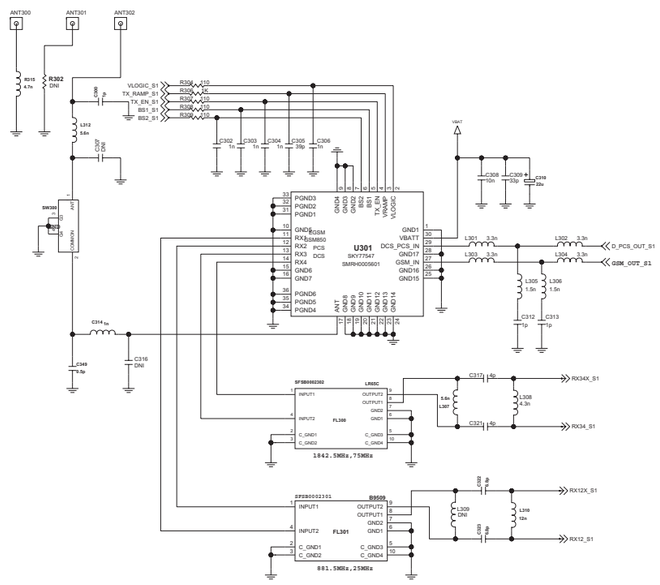
# 7. CIRCUIT DIAGRAM

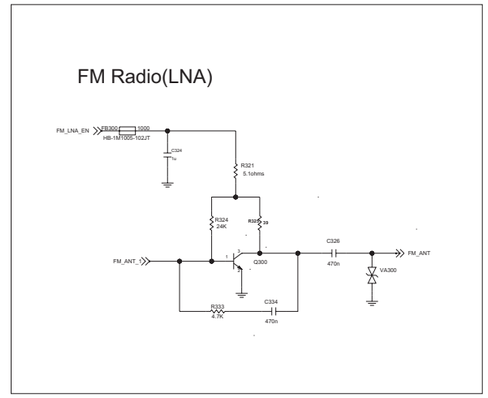


# 7. CIRCUIT DIAGRAM

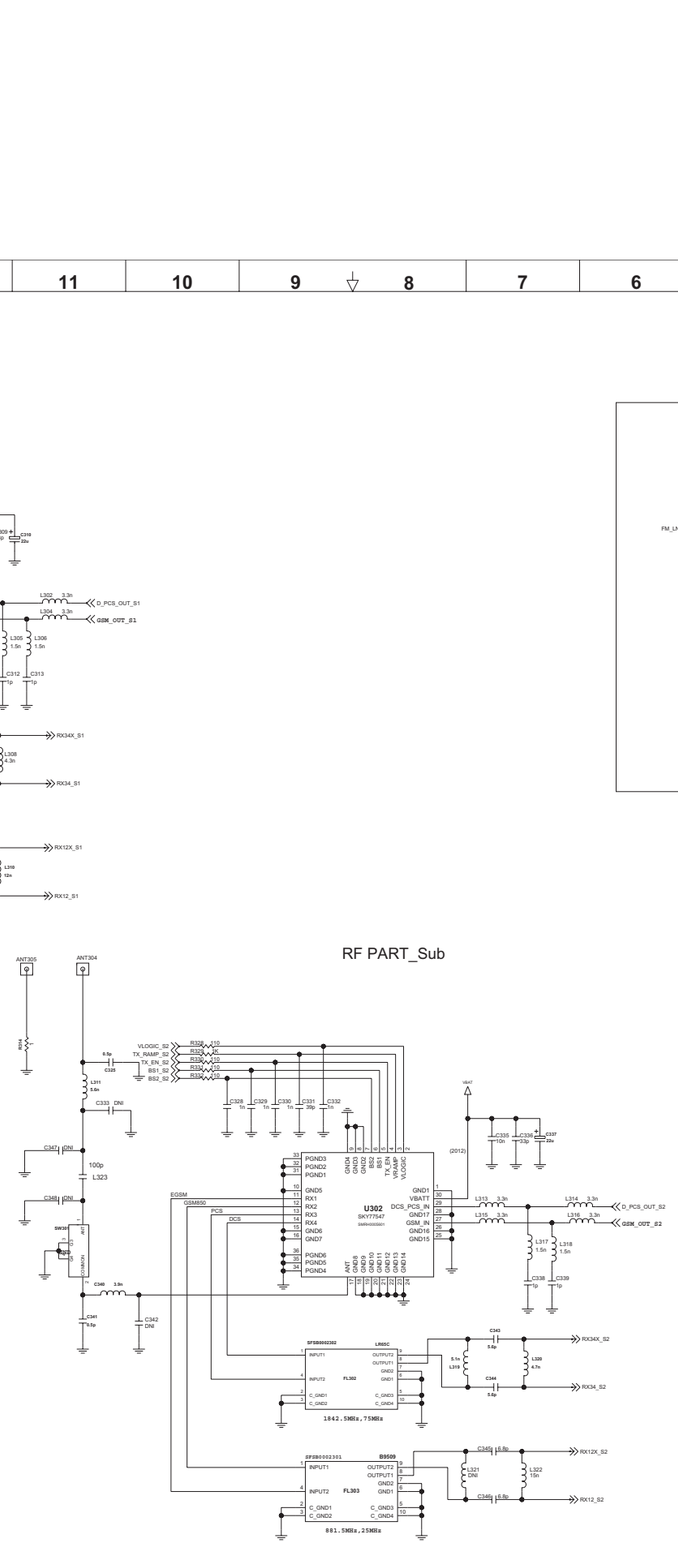
RF PART_Main




FM Radio(LNA)

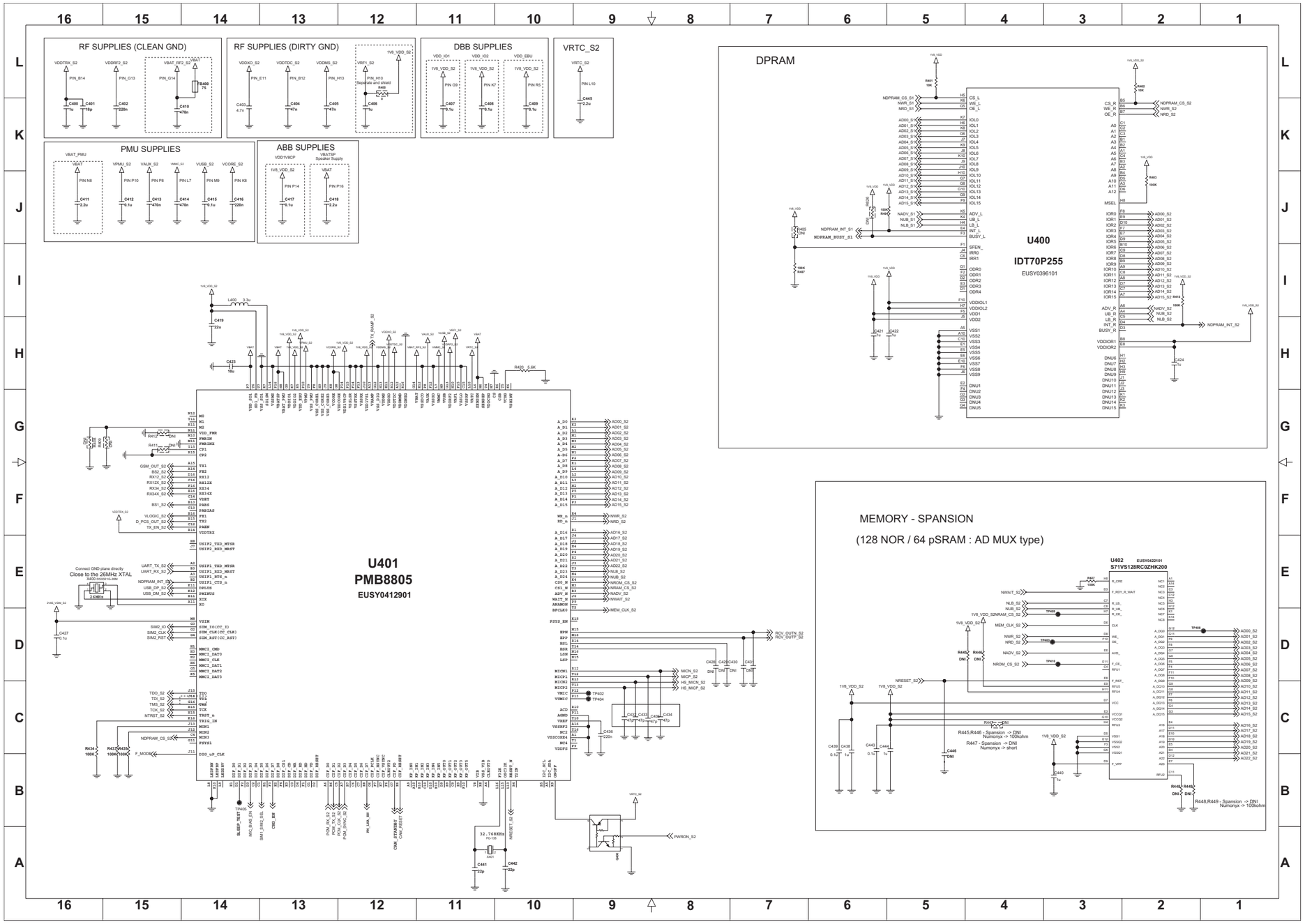



RF PART_Sub

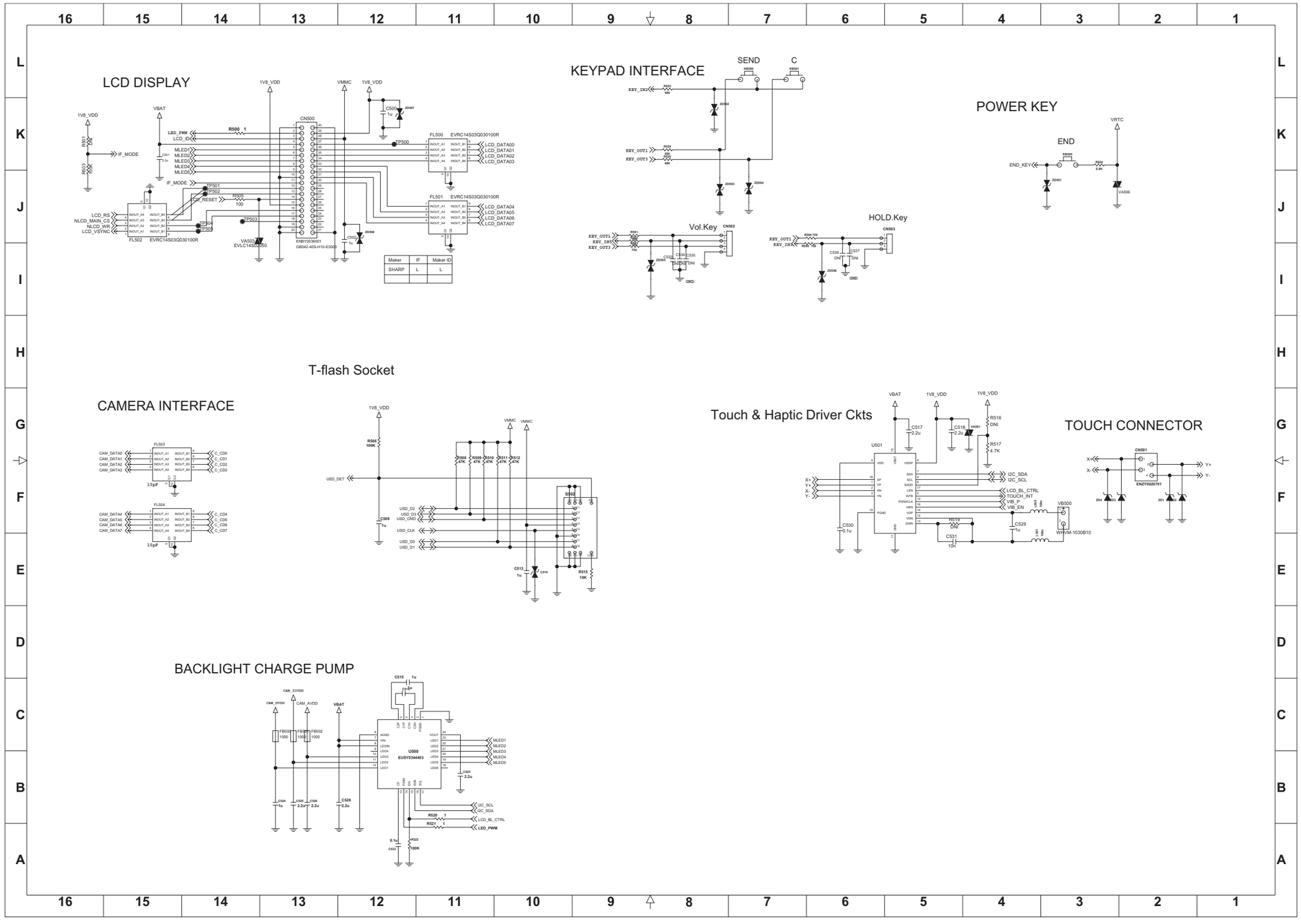



| MODE | VLOGIC | TX_EN | BS1 | BS2 |
|---|---|---|---|---|
| STANDBY | LOW | X | X | X |
| EGSM_RX | HIGH | LOW | LOW | LOW |
| GSM850_RX | HIGH | LOW | LOW | HIGH |
| PCS_RX | HIGH | LOW | HIGH | HIGH |
| DCS_RX | HIGH | LOW | HIGH | LOW |
| LB_TX | HIGH | HIGH | LOW | X |
| HB_TX | HIGH | HIGH | HIGH | X |

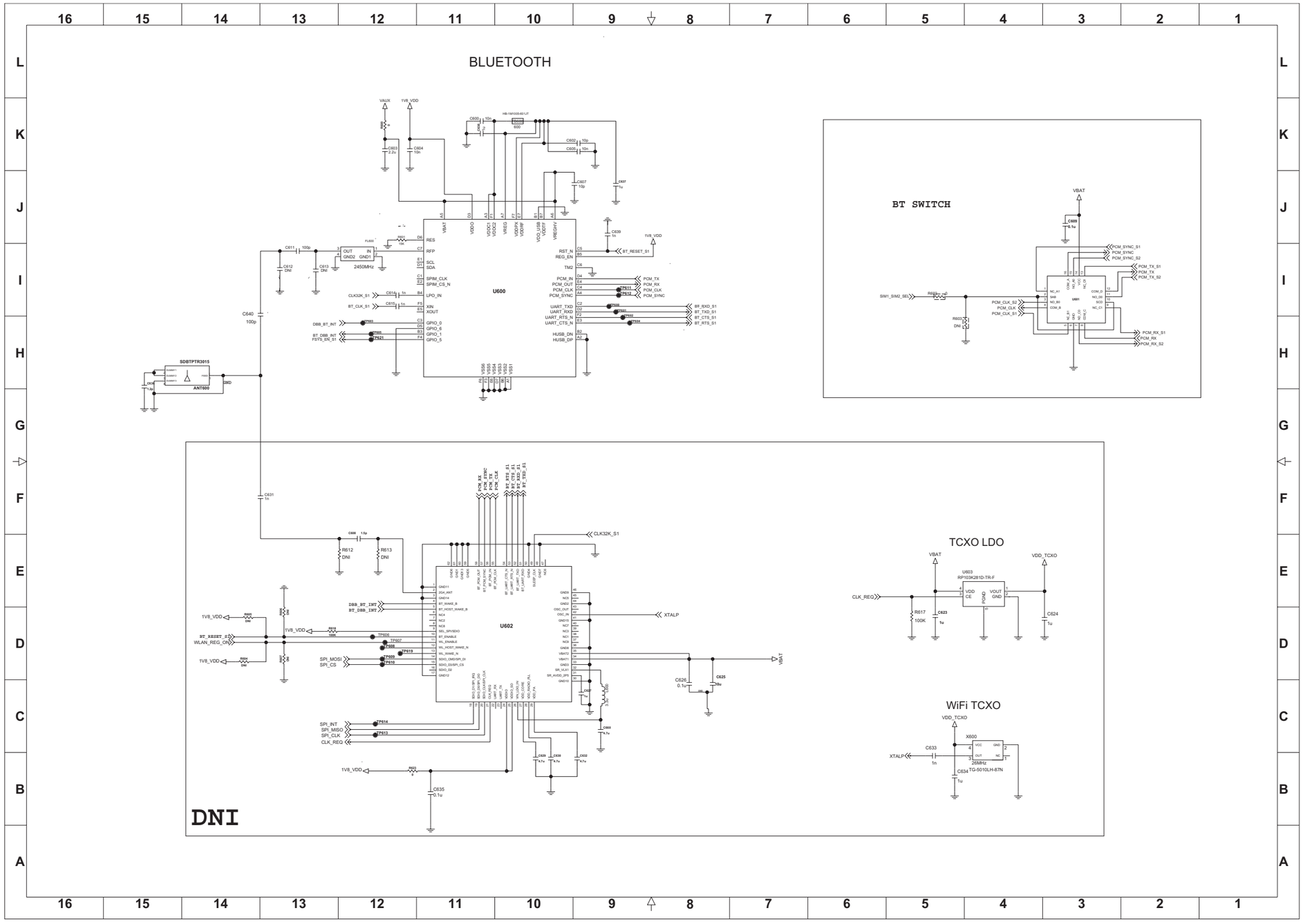
# 7. CIRCUIT DIAGRAM



# 7. CIRCUIT DIAGRAM



# 7. CIRCUIT DIAGRAM



# 8. BGA PIN MAP

## 8.1 BGA IC pin check (U101) - SIM 1

▪ **Ball Diagram (Top View), PMB8810(A-GOLDRADIO+)**

**SIM 1**

| | A | B | C | D | E | F | G | H | J | K | L | M | N | P | R | T | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 16 | VSSRF2 | FE1 | RX12X | RX12 | RX34X | RX34 | TMS | TCK | TDI | TRIG_IN | F32K | EPP | | VBATSP | VDDNEG | | 16 |
| 15 | TX1 | TX2 | VSSRF | | | VSSLO | | TRST_n | TDO | FSYS_EN | OSC32K | EPN | | VSSLSR | CP2 | CP1 | 15 |
| 14 | FE2 | VDDTRX | | | | VSSTRX | VBAT | | | | VSSMS | | | VDD1V8CP | HSL | HSR | 14 |
| 13 | VRAMP | PABS | | | | VSSRX | VDDRF2 | VDDMS | MON1 | | RESET_N | | | VUMIC | MICN2 | MICP2 | 13 |
| 12 | | VDDTDC | PAEN | | VSSDCO | VSSXO | VSSDIG | SWIF_TXRX | MON2 | DMINUS | | | M0 | VMIC | MICN1 | MICP1 | 12 |
| 11 | XO | XOX | | | VDDXO | | FSYS1 | DIGuP1 | DIGuP_CLK | DPLUS | | FMRINX | VDD_FMR | AGND | M2 | M1 | 11 |
| 10 | KP_IN1 | KP_IN2 | KP_IN3 | KP_IN4 | KP_IN5 | KP_OUT5 | DIGuP2 | VRF1 | VDD1V81 | LEDFBP | VRTC | FMRIN | | VPMU | ACD | VREF | 10 |
| 9 | KP_IN0 | KP_OUT1 | KP_OUT2 | KP_OUT0 | KP_OUT3 | | VDDIO1 | VSSCORE2 | VSSCORE3 | | | VUSB | | | ONOFF | VSS_PMU | 9 |
| 8 | I2S1_RX | I2S1_TX | I2S1_WA0 | I2S1_CLK0 | CIF_D7 | VSSCORE1 | VDDCORE | USIF2_TXD_MTSR | USIF2_CTS_n | VCORE | LEDFBN | VSIM | VBAT_PMU | VAUX | VSS_VIB | VIB | 8 |
| 7 | CIF_D3 | CIF_D4 | CIF_D6 | | CIF_VSYNC | CIF_HSYNC | CIF_PD | USIF2_RTS_n | USIF2_RXD_MRST | VDDIO2 | VMMC | CS | | VDD_SD1 | SD1SW | VSS_SD1 | 7 |
| 6 | CIF_D0 | CIF_D1 | CIF_D5 | | CIF_RESET | CLKOUT2 | CIF_PCLK | MMCI_DAT1 | WAIT_n | VSHNT | SENSEN | SENSEP | | | | SD1_FB | 6 |
| 5 | I2C_SDA | I2C_SCL | CIF_D2 | | | | MMCI_DAT2 | | | MMCI_DAT3 | | | | A/D13 | VDD_EBU | VCHG | 5 |
| 4 | CLKOUT0 | T2IN | MON3 | DIF_RD | | DIF_CS1 | CC_RST | A19 | A17 | CS0_n | A/D9 | | A24 | A20 | WR_n | VDDCHG | 4 |
| 3 | USIF1_RTS_n | USIF1_RXD_MRST | DIF_WR | DIF_D3 | DIF_CD | DIF_D7 | CC_IO | MMCI_DAT0 | A22 | A/D0 | A/D11 | CS1_n | A/D4 | A/D15 | ADV_n | A23 | 3 |
| 2 | USIF1_TXD_MTSR | USIF1_CTS_n | DIF_D4 | DIF_RESET | DIF_D8 | DIF_D2 | CC_CLK | MMCI_CLK | A18 | A/D1 | A/D10 | A/D5 | A/D12 | A/D7 | A21 | BFCLKO | 2 |
| 1 | VSSCORE4 | DIF_D6 | DIF_D5 | DIF_D1 | DIF_D0 | DIF_HD | DIF_VD | MMCI_CMD | RD_n | A/D8 | A/D2 | A/D3 | A/D6 | A/D14 | A16 | | 1 |
| | A | B | C | D | E | F | G | H | J | K | L | M | N | P | R | T | |

: not in use

## 8.2 BGA IC pin check (U401) - SIM 2

▪ **Ball Diagram (Top View), PMB8810(A-GOLDRADIO+)**

**SIM 2**

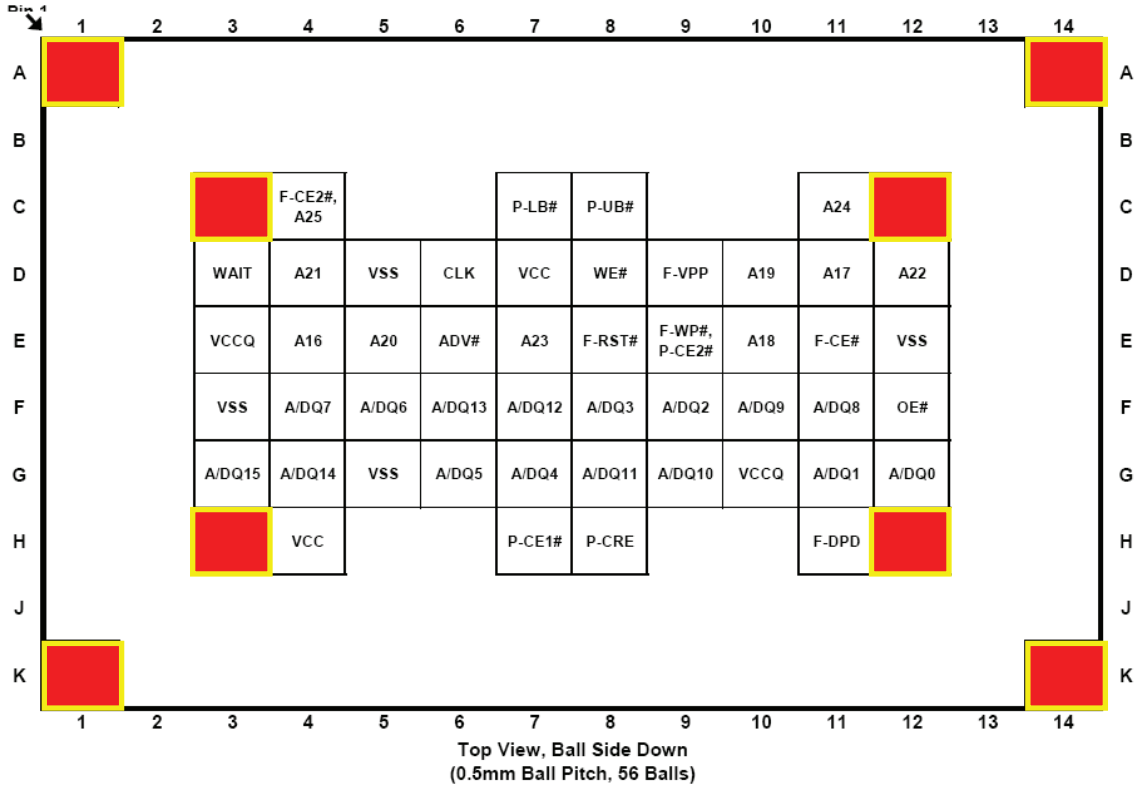
| | A | B | C | D | E | F | G | H | J | K | L | M | N | P | R | T | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 16 | VSSRF2 | FE1 | RX12X | RX12 | RX34X | RX34 | TMS | TCK | TDI | TRIG_IN | F32K | EPP | | VBATSP | VDDNEG | | 16 |
| 15 | TX1 | TX2 | VSSRF | | | VSSLO | | TRST_n | TDO | | OSC32K | EPN | | VSSLSR | CP2 | CP1 | 15 |
| 14 | FE2 | VDDTRX | | | | VSSTRX | VBAT | | | | VSSMS | | | VDD1V8CP | HSL | HSR | 14 |
| 13 | VRAMP | PABS | | | | VSSRX | VDDRF2 | VDDMS | MON1 | | RESET_N | | | VUMIC | MICN2 | MICP2 | 13 |
| 12 | | VDDTDC | PAEN | | VSSDCO | VSSXO | VSSDIG | | MON2 | DMINUS | | | | VMIC | MICN1 | MICP1 | 12 |
| 11 | XO | XOX | | | VDDXO | | | | | DPLUS | | FMRINX | VDD_FMR | AGND | M2 | M1 | 11 |
| 10 | | | | | | | | VRF1 | VDD1V81 | LEDFBP | VRTC | | | VPMU | | VREF | 10 |
| 9 | | | | | | | VDDIO1 | VSSCORE2 | VSSCORE3 | | | VUSB | | | ONOFF | VSS_PMU | 9 |
| 8 | I2S1_RX | I2S1_TX | I2S1_WA0 | I2S1_CLK0 | CIF_D7 | VSSCORE1 | VDDCORE | | | VCORE | LEDFBN | VSIM | VBAT_PMU | VAUX | VSS_VIB | | 8 |
| 7 | | | | | | | CIF_PD | | | VDDIO2 | VMMC | CS | | VDD_SD1 | SD1SW | VSS_SD1 | 7 |
| 6 | | | | | | | | MMCI_DAT1 | WAIT_n | | SENSEN | SENSEP | | | | SD1_FB | 6 |
| 5 | | | | | | | MMCI_DAT2 | | | MMCI_DAT3 | | | | A/D13 | VDD_EBU | VCHG | 5 |
| 4 | | | MON3 | | | | CC_RST | A19 | A17 | CS0_n | A/D9 | | A24 | A20 | WR_n | | 4 |
| 3 | | USIF1_RXD_MRST | | DIF_D3 | | DIF_D7 | CC_IO | | A22 | A/D0 | A/D11 | CS1_n | A/D4 | A/D15 | ADV_n | A23 | 3 |
| 2 | USIF1_TXD_MTSR | USIF1_CTS_n | | | | | CC_CLK | | A18 | A/D1 | A/D10 | A/D5 | A/D12 | A/D7 | A21 | BFCLKO | 2 |
| 1 | VSSCORE4 | | DIF_D5 | DIF_D1 | | | | | RD_n | A/D8 | A/D2 | A/D3 | A/D6 | A/D14 | A16 | | 1 |
| | A | B | C | D | E | F | G | H | J | K | L | M | N | P | R | T | |

: **not in use**

## 8.3 BGA IC pin check (U100) - SIM 1

▪ **Ball Diagram (Top View), KA8520N00M-BWWW**

**SIM 1**




Top View, Ball Side Down
(0.5mm Ball Pitch, 56 Balls)

: not in use

## 8.4 BGA IC pin check (U402) - SIM 2

▪ **Ball Diagram (Top View), S71VS128RC0ZHK200**

**SIM 2**

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| A | | | | | | | | | | | | | | |
| B | | | | | | | | | | | | | | |
| C | | | | F2-CE# | | | R-LB# | R-UB# | | | A24 | | | |
| D | | | WAIT# | A21 | VSS | CLK | VCC | WE# | VPP | A19 | A17 | A22 | | |
| E | | | VCCQ | A16 | A20 | ADV# | A23 | F-RST# | F-WP# | A18 | F1-CE# | VSS | | |
| F | | | VSS | ADQ7 | ADQ6 | ADQ13 | ADQ12 | ADQ3 | ADQ2 | ADQ9 | ADQ8 | OE# | | |
| G | | | ADQ15 | ADQ14 | VSS | ADQ5 | ADQ4 | ADQ11 | ADQ10 | VCCQ | ADQ1 | ADQ0 | | |
| H | | | | VCCQ | | | R-CS# | P-CRE, P-MODE# | | | F-DPD | | | |
| J | | | | | | | | | | | | | | |
| K | | | | | | | | | | | | | | |

56 Ball NOR / PSRAM AD-Mux Ballout 0.5 mm pitch

NOR / PSRAM Upper Address

NOR / PSRAM Address / Data Mux (AD-Mux)

**: not in use**

## 8.5 BGA IC pin check (U400) – Dual Port SRAM

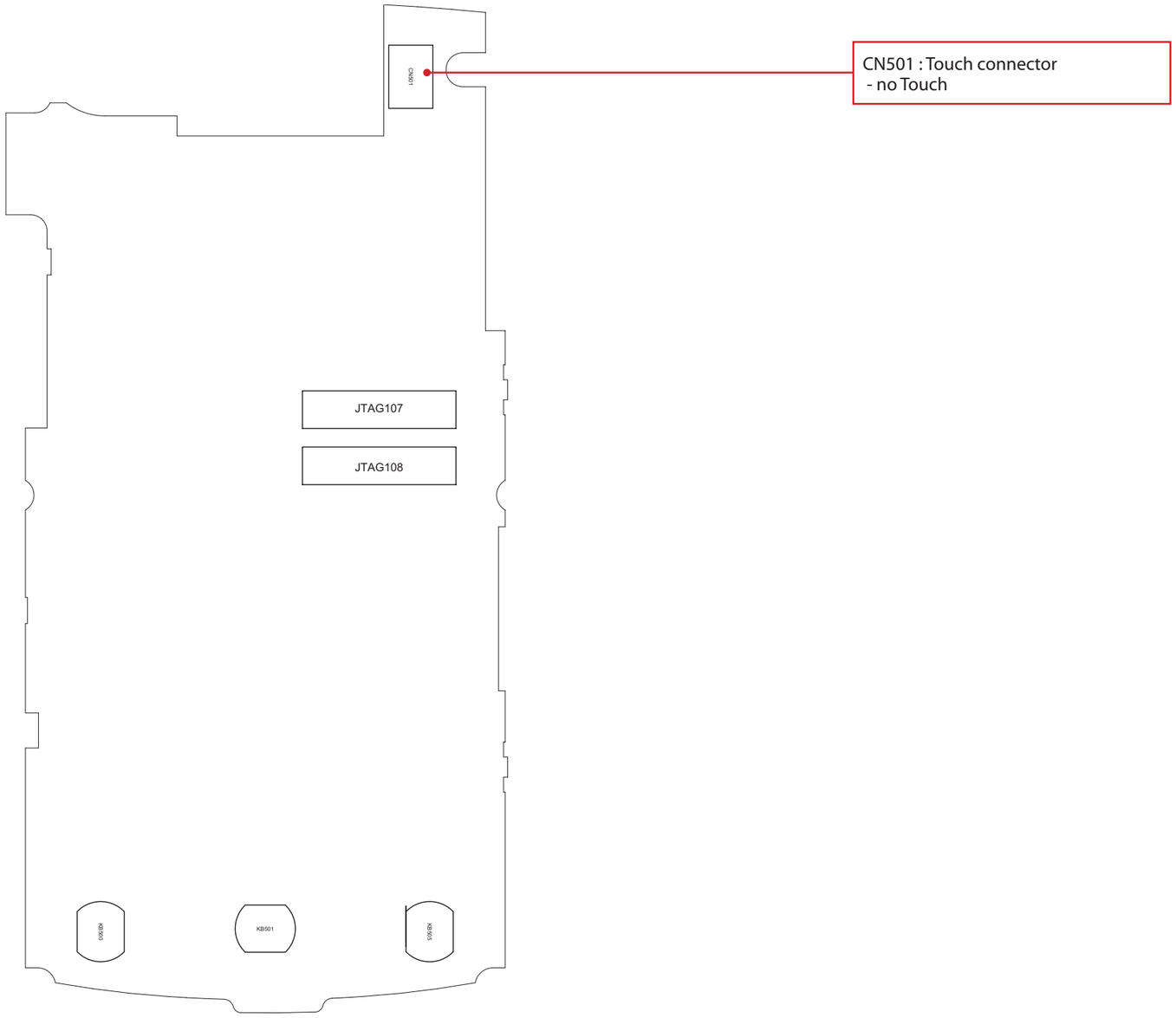
▪ **Ball Diagram (Top View), IDT709255**

**DPRAM**

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| A | | | | UB#R | VSS | ADV#R | I/OR15 | I/OR12 | I/OR10 | VSS | A |
| B | | | | | CE#R | WE#R | OE#R | VDDIOR | I/OR9 | I/OR6 | B |
| C | | | | | LB#R | | I/OR14 | I/OR11 | I/OR7 | VSS | C |
| D | | | | INT#R | | | I/OR13 | I/OR8 | I/OR5 | I/O2R | D |
| E | VSS | | | INT#L | VSS | VSS | I/OR4 | VDDIOR | I/OR1 | VSS | E |
| F | SFEN# | | | | VCC | VSS | I/OR3 | I/OR0 | I/OL15 | VDDIOL | F |
| G | | | | | OE#L | I/OL3 | I/OL11 | I/OL12 | I/OL14 | I/OL13 | G |
| H | | | | LB#L | CE#L | I/OL1 | VDDIOL | MSEL | | I/OL10 | H |
| J | | | | | VCC | VSS | I/OL4 | I/OL6 | I/OL8 | I/OL9 | J |
| K | | | | UB#L | ADV#L | WE#L | I/OL0 | I/OL2 | I/OL5 | I/OL7 | K |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | |

: **not in use**

# 9. PCB LAYOUT




LG-P520_MAIN_SPFY0237101_1.1_TOP

U501 : Touch & Haptic Drv
- no Touch

U500 : Backlight C/P
- no LCD backlight

U202 : Audio AMP
- no Sound

CN502 : Side key
- no Volume change

CN203 : B to B Conn.
- no SIM operation
- no Camera Operation

U302 : RF module
- no Service
- RF Sensitivity & TX Pwr

X400 : 26M X-tal
- no Power on
- no Service

BAT100 : Backup Cap
- RTC Reset

CN503 : Side key
- no Hold operation

U205 : Analog SW
- no Headset MIC Change(SIM1/2)

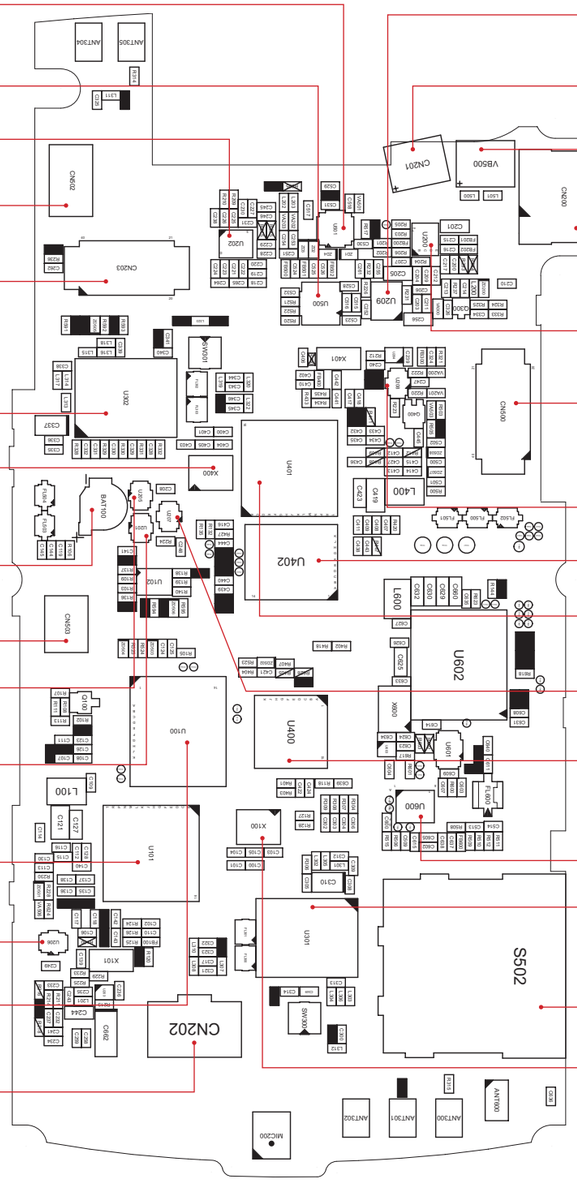
U201 : Analog SW
- no Voice path Change(SIM1/2)

U101 : DBB
- no Power on
- no Service

U206 : Analog SW
- no MIC Change (SIM1/2)

U100 : Memory
- no Booting

CN202 : BAT Conn.
- no Power on




U209 : Charge IC
- no BAT Charge

CN201 : SPK/Receiver
- no Sound

VB500 : Vibrator
- no Vibration

CN200 : I/O Conn.
- no USB Connection
- no Serial Connection

U200 : MUIC
- no Booting
- no USB/Serial Connection

CN500 : LCD Connector
- no Display

U208 : Analog SW
- no USB path change(SIM1/2)

U402 : Memory
- no Booting

U401 : DBB
- no Power on
- no Service

U207 : Analog SW
- no UART path Change(SIM1/2)

U400 : DP Memory
- no Booting

U600 : Bluetooth
- no Bluetooth conn.

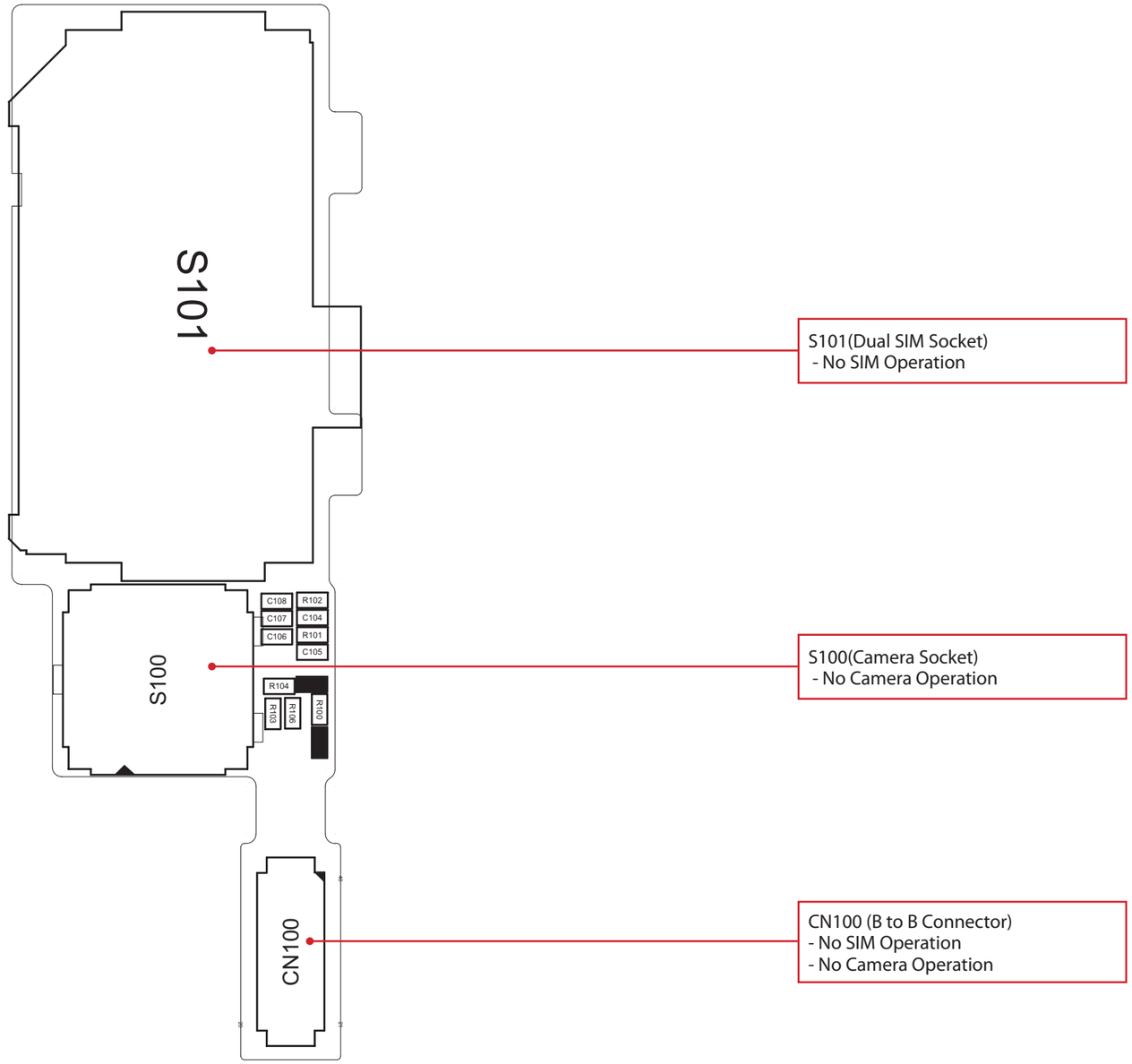
U301 : RF module
- no Service
- RF Sensitivity & TX Pwr

S502 : T-flash Socket
- no T-flash memory

X100 : 26M X-tal
- no Power on
- no Service

LG-P520_MAIN_SPFY0237101_1.1_BOT

# 9. PCB LAYOUT




P520_F_SUB_SPCY0247201_1.1

# 10. STAND ALONE TEST

## 10.1 Introduction

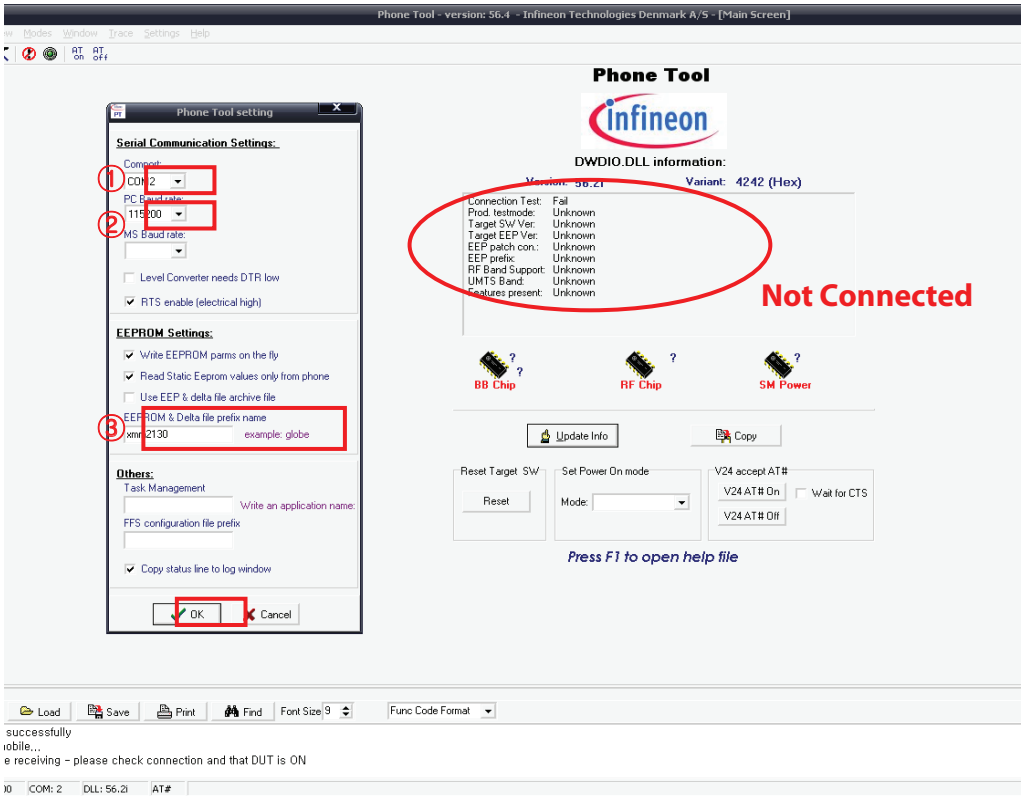
This manual explains how to examine the status of RX and TX of the model.

**A. Tx Test**
TX test - this is to see if the transmitter of the phones is activating normally.

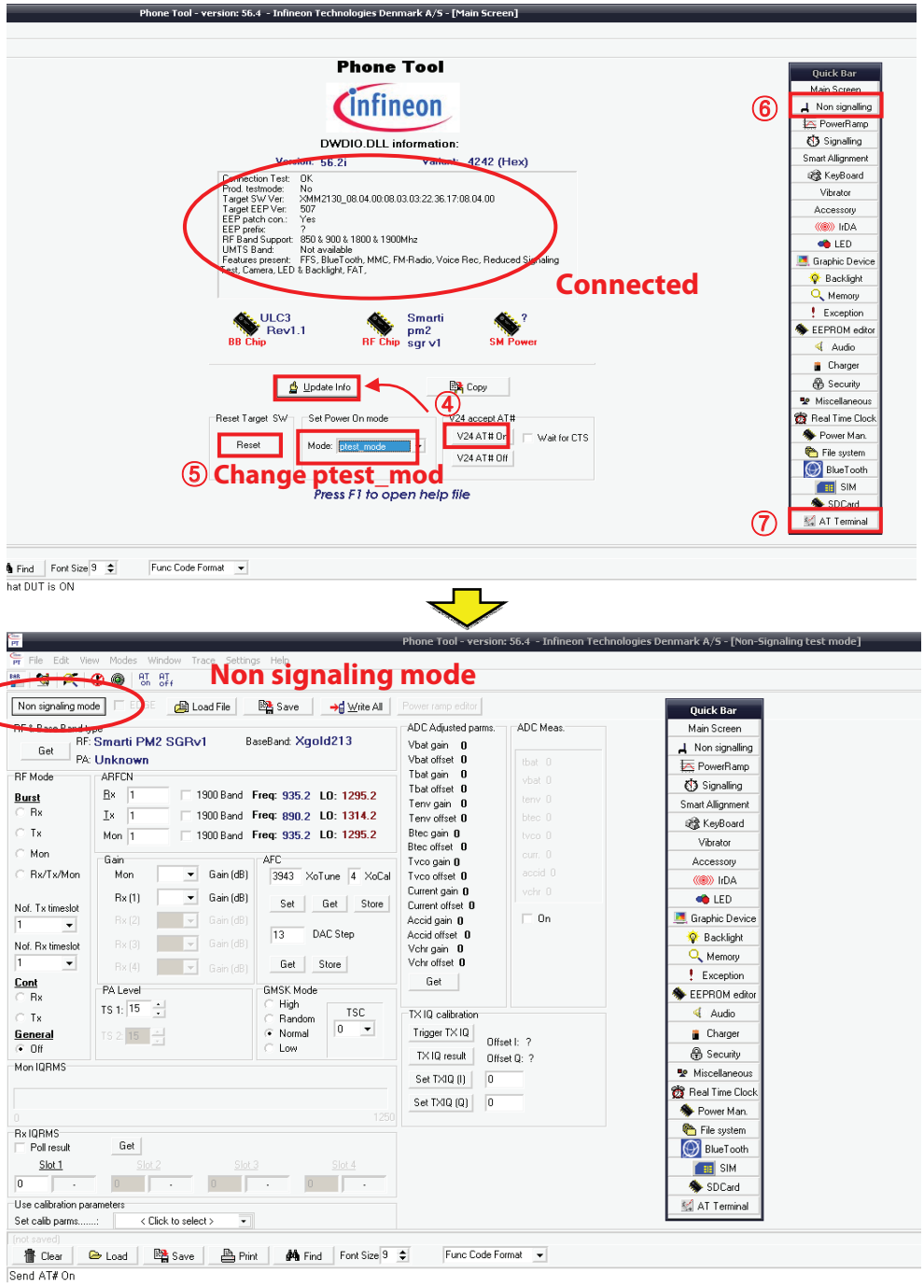
**B. Rx Test**
RX test - this is to see if the receiver of the phones is activating normally.

## 10.2 Setting Method

1. Set COM Port
2. Check PC Baud Rate
3. Confirm EEPROM & Delta file prefix name, and then click “OK”.

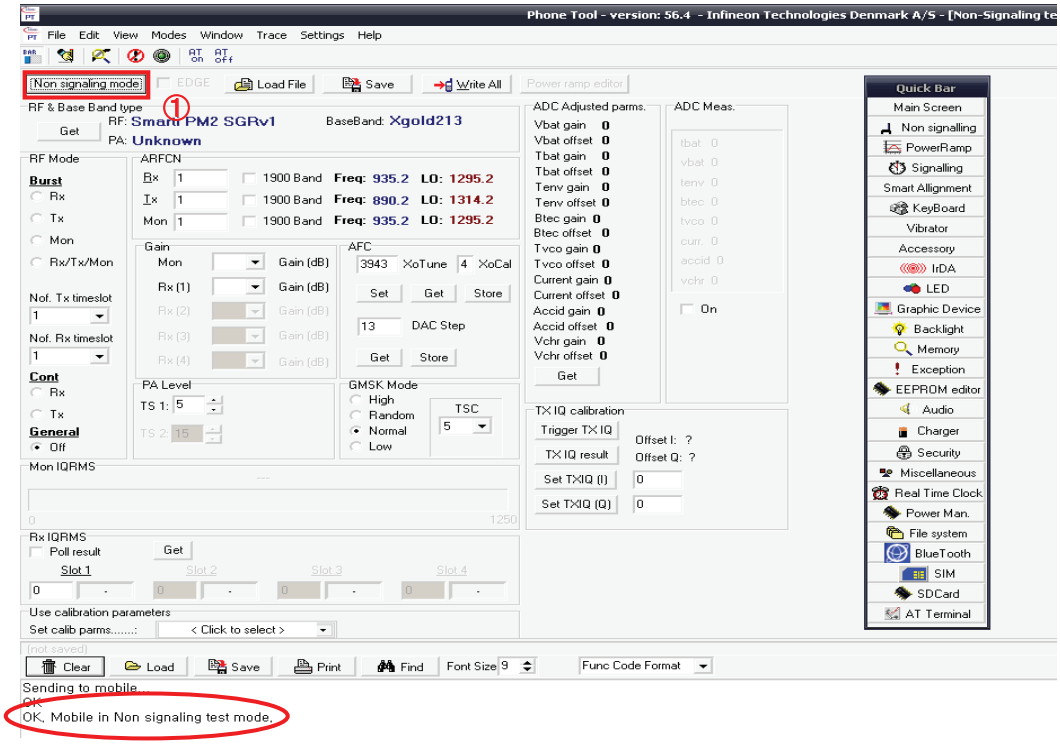


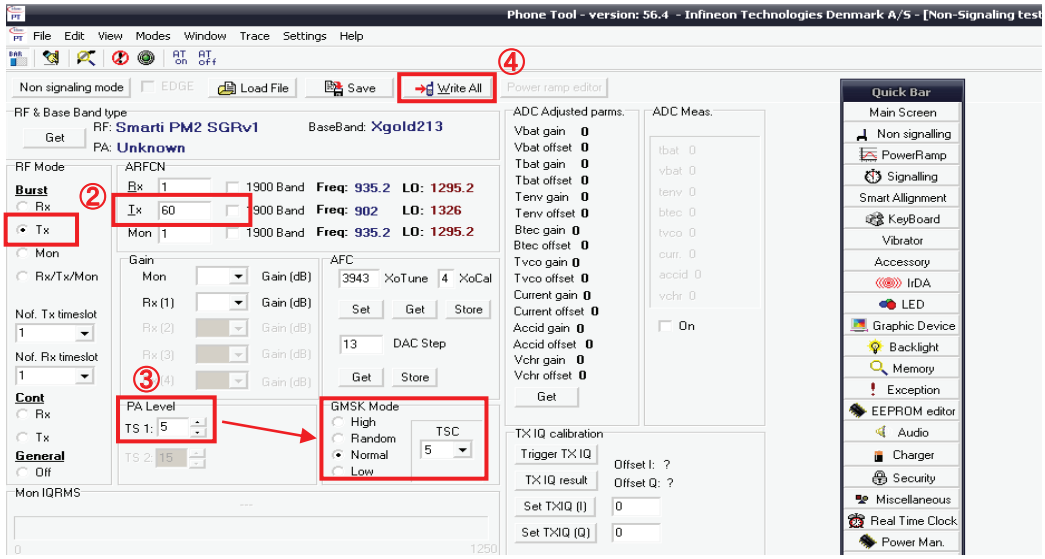
4. For communicating Phone and Test-Program, click “V24 AT# On” and “Update Info” one by one.
5. For the purpose of the Standalone Test, Change the Phone to “ptest mode” and then Click the “Reset” bar.
6. Select “Non signaling” in the Quick Bar menu. Then Standalone Test setup is finished.
7. If you want to test the SIM2 equally, click the “AT Terminal” and then enter “AT%uartpath=1”.
   Then retry 4~6 step again. (uartpath=0 → SIM1, uartpath=1 → SIM2)



## 10.3 Tx Test

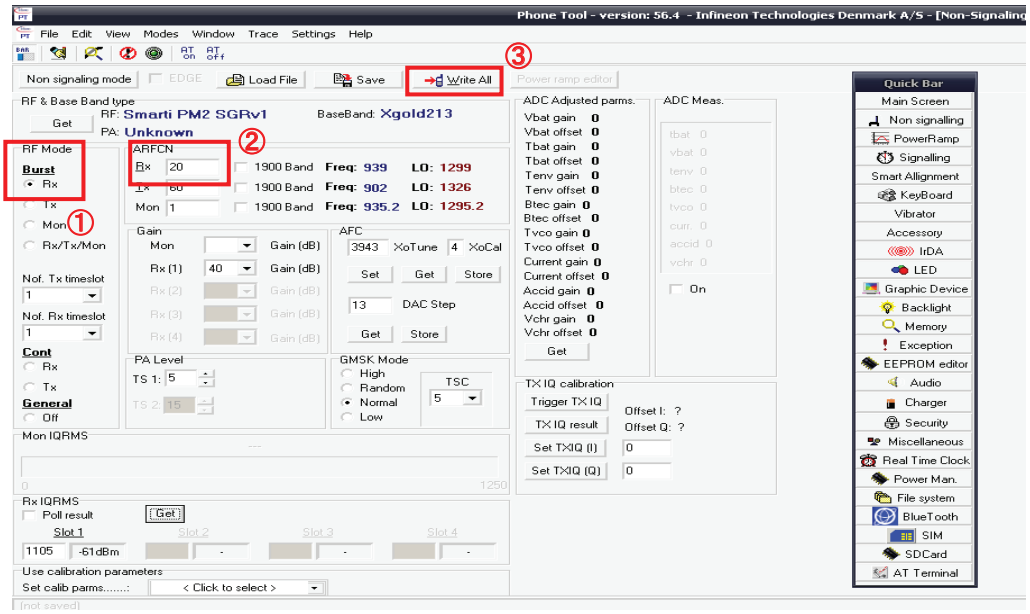
1. “Non signaling mode” bar and then confirm “OK” text in the command line.
2. Select “Tx” in the RF mode menu and put the number of TX Channel in the ARFCN.
3. Put the number of “PCL” in the PA Level menu.
4. Finally, Click “Write All” bar and try the efficiency test of Phone.



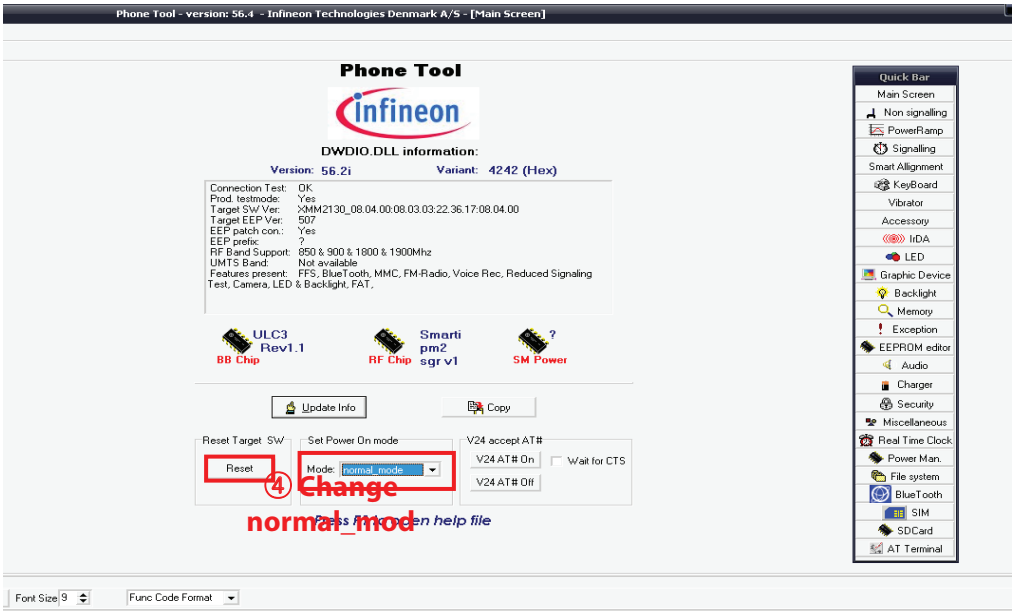



## 10.4 Rx Test

1. Select “Rx” in the RF mode menu.
2. Put the number of RX Channel in the ARFCN.
3. Finally, Click “Write All” bar and try the efficiency test of Phone.




4. The Phone must be changed “normal mode” after finishing Test.
   Change the Phone to “normal mode” and then Click the “Reset” bar.

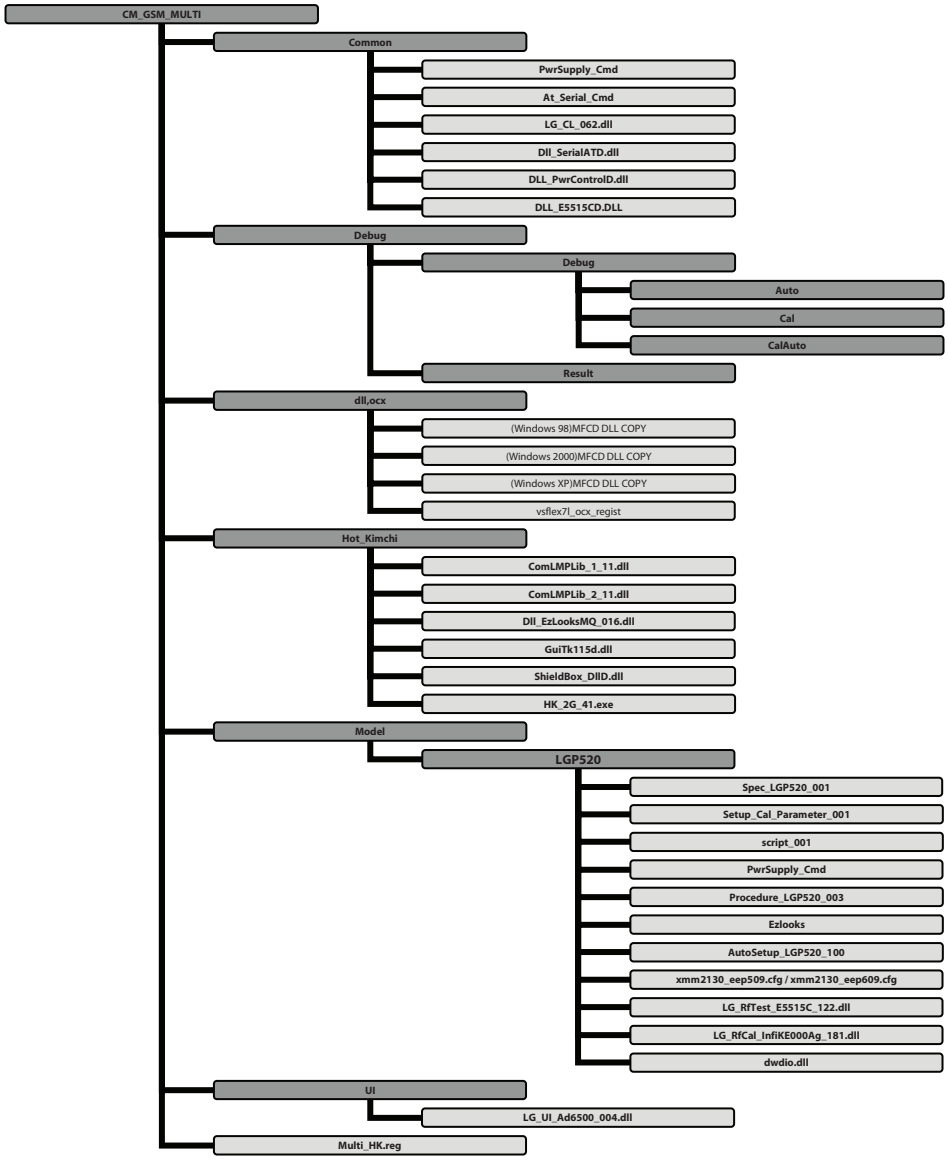


# 11. AUTO CALIBRATION

## 11.1 Overview

Auto-cal (Auto Calibration) is the PC side Calibration tool that perform Tx, Rx and Battery Calibration with Agilent 8960(GSM call setting instrument) and Tektronix PS2521G(Programmable Power supply).
Auto-cal generates calibration data by communicating with phone and measuring equipment then write it into calibration data block of flash memory in GSM phone.

## 11.2 Configuration of HotKimchi



## 11.3 Description of Basic File.

### 11.3.1 Common

-. **LG_CL_062.dll** : Common logic dll, Module In Charge of Reading PID & S/W Version, Booting.
-. **Dll_SerialATD.dll** : Serial Communication Module From Phone by AT Command.
-. **DLL_PwrControlD.dll** : Communication Module From Power supply.
-. **DLL_E5515CD.DLL** : Communication Module From Agilent 8960(Test Set).
-. **At_Serial_Cmd.xml** : Definition File of AT Command.
-. **PwrSupply_Cmd.xml** : Definition File of Power supply command.

### 11.3.2. Debug

-. **Debug** - Cal : Result File of Calibration.
Auto : Result File of Auto Test.
CalAuto : Result File of Cal & Auto Test.

### 11.3.3. dll, ocx

-. **vsflex7l_ocx_regist :** Registration File for System use

-. **(Windows XXX)MFCD DLL :** Registration File for System use

### 11.3.4. HotKimchi

-. **HK_2G_41.exe** : Execute File, HK_2G_XX → XX is File Version.
-. **ComLMPLib_1_11.dll** : Communication Module With PLC or Shield Box In Automation Rack.
Support to J&S Shield Box and Tescom TC-5981A.
-. **ComLMPLib_2_11.dll** : Communication Module With PLC or Shield Box In Automation Rack.
Support to J&S Shield Box and Tescom TC-5981A.
-. **Dll_EzLooksMQ_016.dll** : Communication Module with ezTray Installed In Local PC.
-. **GuiTk115d.dll** : control library
-. **ShieldBox_DllD.dll** : Communication with Shield Box. Support to Tescom TC-5952B.

### 11.3.5. Model

-. **LG_RfCal_InfiKE000Ag_181.dll** : Main Module of Calibration
-. **LG_RfTest_E5515C_122.dll** : Main Module of Auto Test
-. **Xmm2130_eep509.cfg** : Cal Data Save binary Module. → eepXXX.cfg : main, eep(XXX+100).cfg : sub
ex) eep509.cfg : main, eep609.cfb : sub
-. **AutoSetup_LGP520_100.xml** : RF TEST Setup Module.
-. **Ezlooks.xml** : Calibration ezLooks Item & Cal Spec Definition Module.
-. **Procedure_LGP520_003.xml** : RF TEST Procedure Definition Module.
-. **Script_001.xml** : RF TEST Setup & calibration Setup Module.
-. **Spec_LGP520_001.xml** : Definition Module of Auto Test Spec
-. **Setup_Cal_Parameter_001.xml** : Calibration Definition Module.

### 11.3.6. UI

-. **LG_UI_Ad6500_002.dll** : ADI Model UI Dll.

### 11.3.7. Multi_HK

-. Registration File For System Setting.

## 11.4 Auto Calibration setup

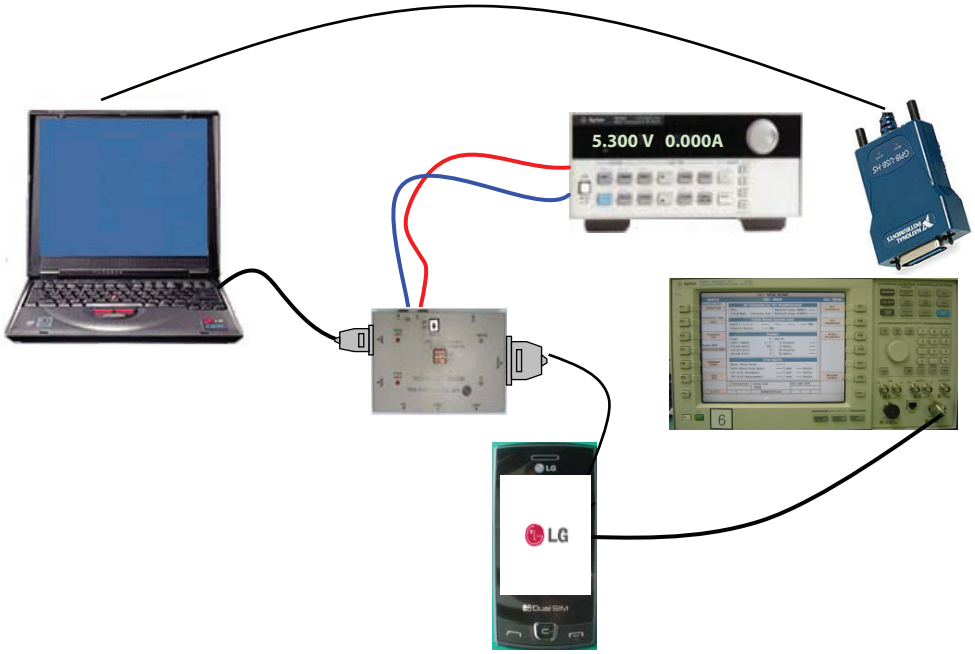
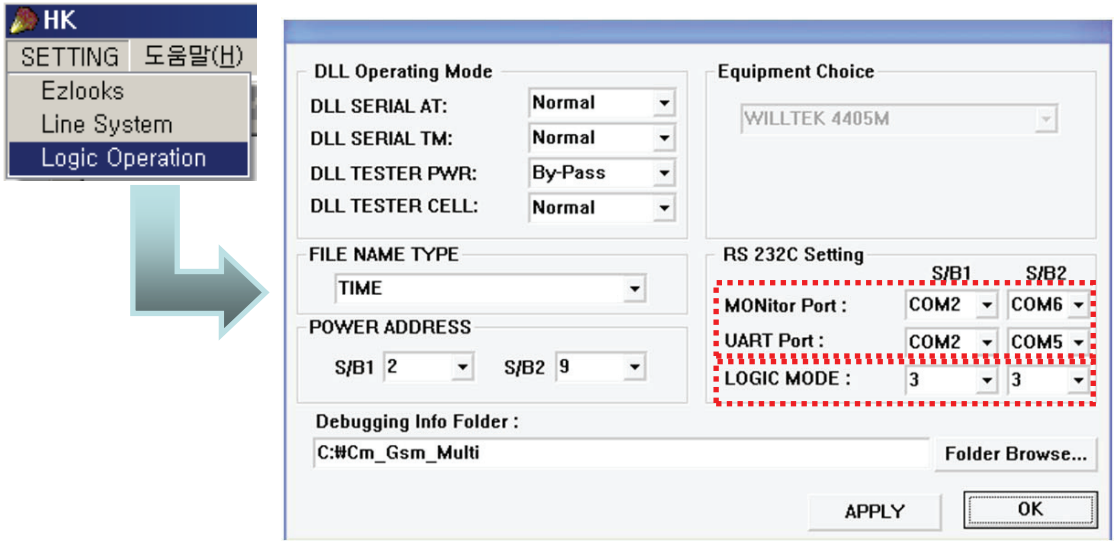



**Figure 11.4.1 Equipment setup**

1. Connect as Fig 13.4.1(RS232 serial cable is connected between COM port of PC and MON port of TEST JIG, in general. GPIB-USB-HS cable is connected between HP8960 and PC.)
2. Set the Power Supply 5.3V
3. Set the 3rd, 4th of DIP SW ON state always
4. Press the Phone power key, if the Remote ON is used, 1st ON state

## 11.5 Procedure

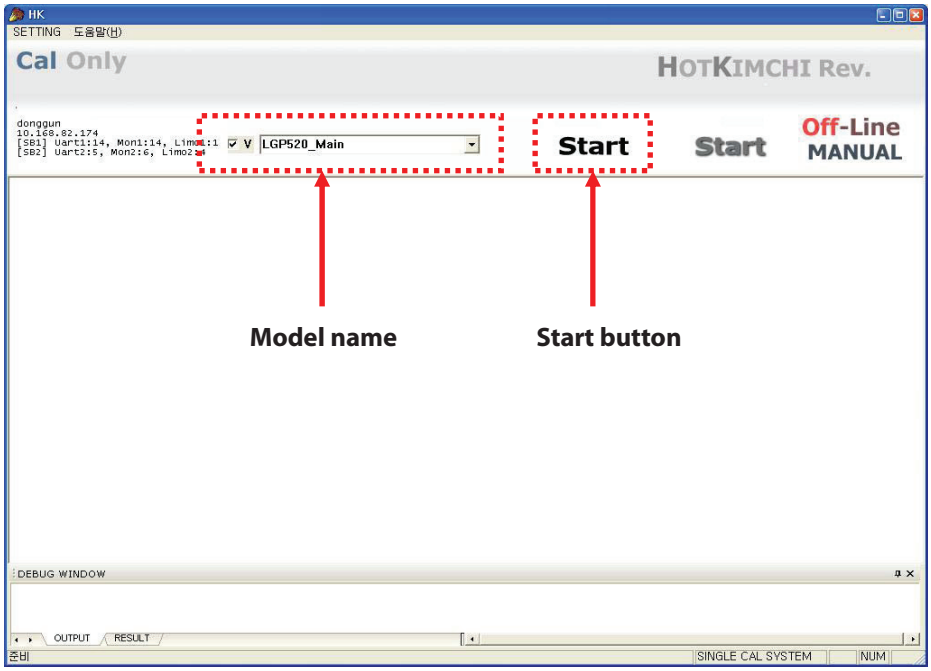
1. Copy the file to C:\Cm_Gsm_Multi
2. Copy the files of((Windows XXX)MFCD DLL, vsflex7l_ocx_regist to C:\Cm_Gsm_Multi\dll,ocx
3. Select MFCD DLL of your computer OS
4. Click on "vsflex7l_ocx_regist"
5. Click on "Multi_HK reg"
6. Connect as Fig 13.4.1.
7. Run *HK_2G_41.exe* to start calibration.
8. Click " Logic Operation" of "SETTING" menu bar



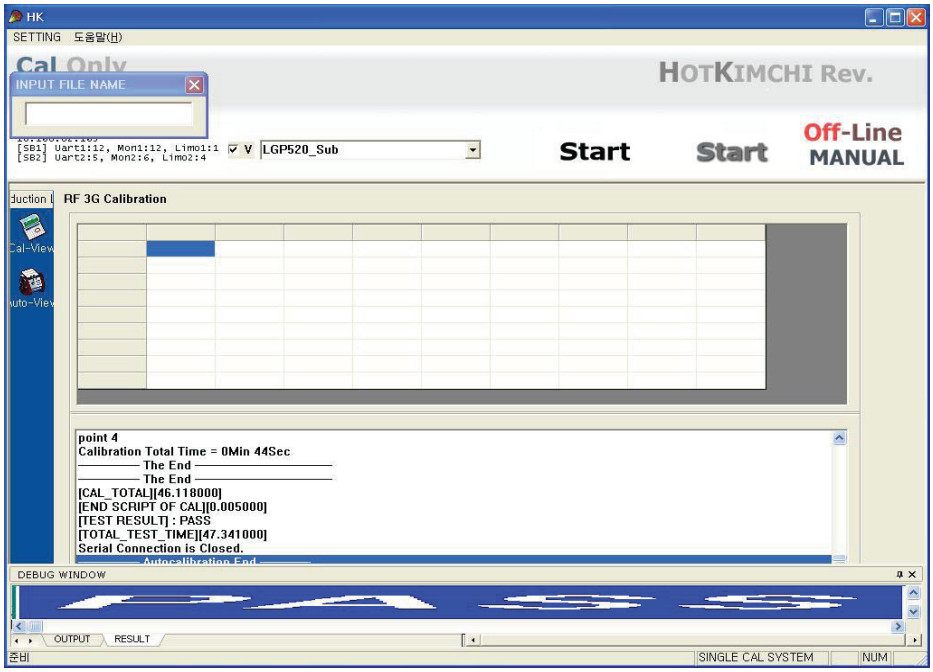

9. Set PORT (using RS232 cable) that PC can communicate with the phone
10. Select " LOGIC MODE" that you want

Logic mode: 1-> Calibration only
2-> Auto test only
3-> Cal & Auto

11. Select the model name “LGP520_Main” or “LGP520_Sub”




12. Click “start” button



## 11.6 AGC

This procedure is for Rx calibration.
In this procedure, We can get RSSI correction value. Set band EGSM and press Start button the result window will show correction values per every power level and gain code and the same measure is performed per every frequency.

## 11.7 APC

This procedure is for Tx calibration.
In this procedure you can get proper scale factor value and measured power level.

## 11.8 ADC

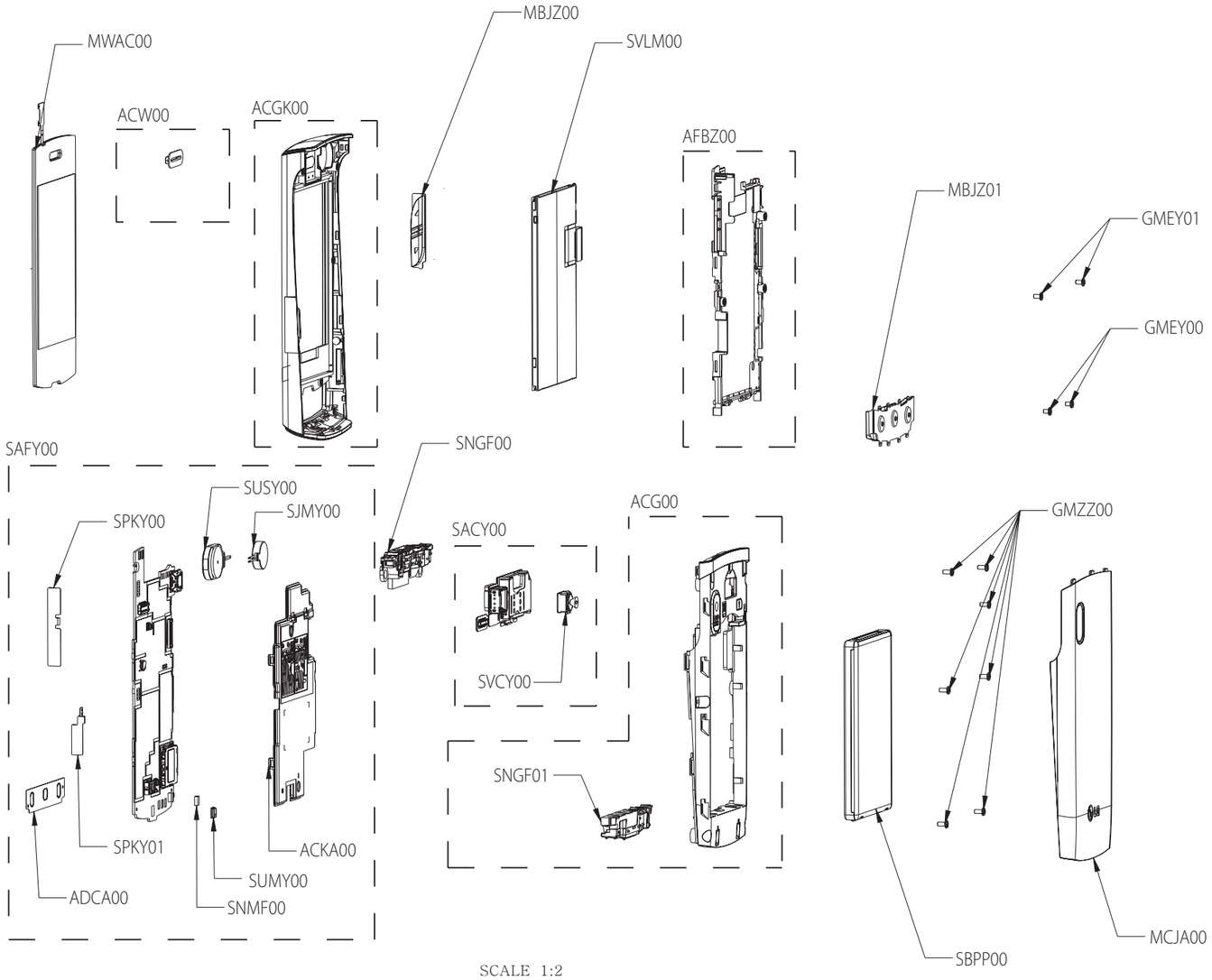
This procedure is for battery calibration.
You can get main Battery Config Table and temperature Config Table will be reset.

## 11.9 Target Power

| BAND | Description | Low | Middle | High |
|---|---|---|---|---|
| GSM 850 | Channel | 128 | 190 | 251 |
| | Frequency | 824.2 MHz | 881.6 MHz | 893.8 MHz |
| | Max power | 33.0 dBm | 33.0 dBm | 33.0 dBm |
| EGSM 900 | Channel | 975 | 37 | 124 |
| | Frequency | 880.2 MHz | 897.4 MHz | 914.8 MHz |
| | Max power | 33.0 dBm | 33.0 dBm | 33.0 dBm |
| DCS 1800 | Channel | 512 | 699 | 885 |
| | Frequency | 1710.2 MHz | 1747.6 MHz | 1784.8 MHz |
| | Max power | 30.0 dBm | 30.0 dBm | 30.0 dBm |
| PCS 1900 | Channel | 512 | 661 | 810 |
| | Frequency | 1850.2 MHz | 1880 MHz | 1909.8 MHz |
| | Max power | 30.0 dBm | 30.0 dBm | 30.0 dBm |

# 12. EXPLODED VIEW & REPLACEMENT PART LIST

## 12.1 EXPLODED VIEW




SCALE 1:2

| No | Description | Location |
|---|---|---|
| 26 | Antenna,Helical | SNGF00 |
| 25 | Microphone,Condenser | SUMY00 |
| 24 | Antenna,Helical | SNMF00 |
| 23 | Speaker,Dual Mode | SUSY00 |
| 22 | Motor,DC | SJMY00 |
| 21 | Dome Assembly,Metal | ADCA00 |
| 20 | Can Assembly,Shield | ACKA00 |
| 19 | PCB,Sidekey | SPKY01 |
| 18 | PCB,Sidekey | SPKY00 |
| 17 | PCB Assembly,Main | SAFY00 |
| 16 | PCB Assembly,Flexible | SACY00 |
| 15 | Screw,Machine | GMZZ00 |
| 14 | Antenna,Helical | SNGF01 |
| 13 | Cover Assembly,Rear | ACG00 |
| 12 | FRAME ASSY | AFBZ00 |
| 11 | Cover Assembly,Front | ACGK00 |
| 10 | Button | MBJZ00 |
| 9 | Screw,Machine | GMEY01 |
| 8 | SCREW MACHINE,BIND | GMEY00 |
| 7 | Decor Assembly | ACW00 |
| 6 | WINDOW,LCD | MWAC00 |
| 5 | LCD,Module-TFT | SVLM00 |
| 4 | BUTTON | MBJZ01 |
| 3 | Camera Module | SVCY00 |
| 2 | Rechargeable Battery,Lithium Polymer | SBPP00 |
| 1 | Cover,Battery | MCJA00 |

## 12.2 Replacement Parts <Mechanic component>

**Note**: This Chapter is used for reference, Part order is ordered by SBOM standard on GCSC

| Level | Location No. | Description | Part Number | Spec | Remark |
|---|---|---|---|---|---|
| 1 | AAD000000 | Addition Assembly | AAD85592002☞ 7 | LGP520.ACISBK BK:Black - | |
| 2 | AFN053800 | Manual Assembly,Operation | AFN75272802☞ 3 | LGP520.ACISBK ZZ:Without Color - | |
| 3 | MBM087200 | Card,Warranty | MCDF0011303 | COMPLEX GD350 CISBK ZZ:Without Color - | |
| 3 | MFL053800 | Manual,Operation | MFL66982802 | PRINTING LGP520.ACISBK ZZ:Without Color - | |
| 2 | MCK004100 | Cover,Battery | MCJA0120802 | COMPLEX LG-P520 CISBK ZZ:Without Color MOLD, PC LUPOY SC-1004A, , , , , | |
| 1 | APEY00 | Phone Assembly | APEY0938301☞ 3 | LG-P520 CISBK BK:Black - | |
| 2 | ACGY00 | Cover Assembly, EMS | ACGY0044501☞ 6 | LG-P520 CISBK BK:Black - | |
| 3 | ACQ063300 | Cover Assembly, Rear | ACGM0169402☞ 18 | LG-P520 CISBK BK:Black - | |
| 4 | FAC010000 | Common | GPZZ0003801 | LG-P520 CISBK ZZ | |
| 4 | MBL025200 | Cap,Earphone Jack | MCCC0073802 | COMPLEX LG-P520 CISBK ZZ:Without Color COMPLEX, (empty), , , , , | |
| 4 | MBL000000 | Cap | MCCZ0045201 | COMPLEX LG-P520 CISBK ZZ:Without Color COMPLEX, (empty), , , , , | |
| 4 | MCK063300 | Cover,Rear | MCJN0127901 | COMPLEX LG-P520 CISBK ZZ:Without Color MOLD, PC LUPOY SC-1004A, , , , , | |
| 4 | MCQ000000 | Damper | MCQ66490201 | COMPLEX LGP520.ACISRD BK:Black - | |
| 4 | MCQ000001 | Damper | MCQ66491401 | COMPLEX LGP520.ACISRD ZZ:Without Color - | |
| 4 | MCQ000005 | Damper | MCQ66498901 | COMPLEX LGP520.ACISBK ZZ:Without Color - | |
| 4 | MJN000003 | Tape | MJN67690601 | COMPLEX LGP520.ACISRD ZZ:Without Color - | |
| 4 | MFG000000 | Locker | MLEY0005201 | COMPLEX LG-P520 CISBK ZZ:Without Color MOLD, PC LUPOY SC-1004A, , , , , | |
| 4 | MCQ000002 | Damper | MPBZ0331201 | COMPLEX LG-P520 CISBK ZZ:Without Color COMPLEX, (empty), , , , , | |
| 4 | MCQ000003 | Damper | MPBZ0331301 | COMPLEX LG-P520 CISBK ZZ:Without Color COMPLEX, (empty), , , , , | |
| 4 | MCQ000004 | Damper | MPBZ0345101 | COMPLEX LG-P520 CISBK ZZ:Without Color COMPLEX, (empty), , , , , | |
| 4 | MHK000000 | Sheet | MSAZ0074901 | COMPLEX LG-P520 CISBK ZZ:Without Color COMPLEX,(empty), | |
| 4 | MJN000000 | Tape | MTAZ0352501 | COMPLEX LG-P520 CISBK ZZ:Without Color COMPLEX, (empty), , , , , | |

# 12. EXPLODED VIEW & REPLACEMENT PART LIST

| Level | Location No. | Description | Part Number | Spec | Remark |
|---|---|---|---|---|---|
| 4 | MJN000001 | Tape | MTAZ0352601 | COMPLEX LG-P520 CISBK ZZ:Without Color COMPLEX, (empty), , , , , | |
| 4 | MJN000002 | Tape | MTAZ0362401 | COMPLEX LG-P520 CISBK ZZ:Without Color COMPLEX, (empty), , , , , | |
| 4 | MKC009400 | Window,Camera | MWAE0065501 | COMPLEX LG-P520 CISBK ZZ:Without Color CUTTING, PMMA MR 200, , , , , | |
| 3 | ACQ003400 | Cover Assembly,Bar | ACGV0021702☞ 17 | LG-P520 CISBK ZZ:Without Color - | |
| 4 | ACGK00 | Cover Assembly, Front | ACGK0170501☞ 17 | LG-P520 CISBK ZZ:Without Color - | |
| 5 | GPZZ00 | Common | GPZZ0003801 | LG-P520 CISBK ZZ | |
| 5 | MBJZ00 | Button | MBJZ0042501 | COMPLEX LG-P520 CISBK ZZ:Without Color COMPLEX, (empty), , , , , | |
| 5 | MTAZ02 | Cap,Multimedia Card | MCCG0025901 | COMPLEX LG-P520 CISBK ZZ:Without Color COMPLEX, (empty), , , , , | |
| 5 | MCJK00 | Cover,Front | MCJK0135601☞ 4 | COMPLEX LG-P520 CISBK ZZ:Without Color MOLD, PC LUPOY SC-1004A, , , , , | |
| 6 | MBFZ00 | Bracket | MBFZ0055201 | COMPLEX LG-P520 CISBK ZZ:Without Color PRESS, STS, , , , , | |
| 6 | MICE01 | Insert,Nut | MICE0016901 | COMPLEX MECH_COMMON ZZ:Without Color - | |
| 6 | MICE00 | Insert,Nut | MICE0016903 | COMPLEX MECH_COMMON ZZ:Without Color - | |
| 6 | MICE02 | Insert,Nut | MICE0016911 | COMPLEX MECH_COMMON ZZ:Without Color - | |
| 5 | MDAY01 | Decor | MDAY0086401 | COMPLEX LG-P520 CISBK ZZ:Without Color MOLD, PC LUPOY SC-1004A, , , , , | |
| 5 | MDAY00 | Decor | MDAY0086501 | COMPLEX LG-P520 CISBK ZZ:Without Color MOLD, PC LUPOY SC-1004A, , , , , | |
| 5 | MFBZ01 | Filter | MFBZ0027301 | COMPLEX LG-P520 CISBK ZZ:Without Color COMPLEX, (empty), , , , , | |
| 5 | MPBG00 | Damper,LCD | MPBG0114101 | COMPLEX LG-P520 CISBK ZZ:Without Color COMPLEX, (empty), , , , , | |
| 5 | MPBZ00 | Damper | MPBZ0332301 | COMPLEX LG-P500 TMO ZZ:Without Color COMPLEX, (empty), , , , , | |
| 5 | MTAB00 | Tape,Protect | MTAB0429801 | COMPLEX LG-P520 CISBK ZZ:Without Color COMPLEX, (empty), , , , , | |
| 5 | MDAY02 | Tape,Protect | MTAB0452801 | COMPLEX LG-P520 CISBK ZZ:Without Color COMPLEX,(empty), | |
| 5 | MFBZ00 | Tape,Protect | MTAB0452901 | COMPLEX LG-P520 CISBK ZZ:Without Color COMPLEX,(empty), | |
| 5 | MTAZ01 | Tape | MTAZ0351801 | COMPLEX LG-P520 CISBK ZZ:Without Color COMPLEX, (empty), , , , , | |
| 5 | MTAZ04 | Tape | MTAZ0352101 | COMPLEX LG-P520 CISBK ZZ:Without Color COMPLEX, (empty), , , , , | |
| 5 | MTAZ00 | Tape | MTAZ0352201 | COMPLEX LG-P520 CISBK ZZ:Without Color COMPLEX, (empty), , , , , | |

| Level | Location No. | Description | Part Number | Spec | Remark |
|---|---|---|---|---|---|
| 5 | MTAZ05 | Tape | MTAZ0361901 | COMPLEX LG-P520 BALBK BK:Black COMPLEX, (empty), , , , , | |
| 5 | MTAZ06 | Tape | MTAZ0362501 | COMPLEX LG-P520 CISBK ZZ:Without Color COMPLEX, (empty), , , , , | |
| 4 | ACW000000 | Decor Assembly | ACW73517001☞ 2 | LGP520.ACISRD BK:Black - | |
| 5 | MCR000000 | Decor | MDAY0089001 | COMPLEX LG-P520 CISBK ZZ:Without Color MOLD, PC LUPOY SC-1004A, , , , , | |
| 5 | MJN000000 | Tape | MTAZ0352001 | COMPLEX LG-P520 CISBK ZZ:Without Color COMPLEX, (empty), , , , , | |
| 4 | AFBZ00 | Frame Assembly | AFBZ0021201☞ 6 | LG-P520 CISBK ZZ:Without Color - | |
| 5 | MDS000000 | Gasket | MDS63533501 | COMPLEX LGP520.ACISBK ZZ:Without Color - | |
| 5 | MFEZ00 | Frame | MFEZ0037701☞ 2 | COMPLEX LG-P520 CISBK ZZ:Without Color MOLD, PC LUPOY SC-1004A, , , , , | |
| 6 | MBFZ00 | Bracket | MBFZ0055301 | COMPLEX LG-P520 CISBK ZZ:Without Color PRESS, STS, , , , , | |
| 6 | MICE00 | Insert,Nut | MICE0016903 | COMPLEX MECH_COMMON ZZ:Without Color - | |
| 5 | MJN000003 | Tape | MJN67692001 | COMPLEX LGP520.ACISBK ZZ:Without Color TAPE(FRAME_FRONT) | |
| 5 | MTAZ00 | Tape | MTAZ0352301 | COMPLEX LG-P520 CISBK ZZ:Without Color COMPLEX, (empty), , , , , | |
| 5 | MTAZ01 | Tape | MTAZ0362701 | COMPLEX LG-P520 CISBK ZZ:Without Color COMPLEX, (empty), , , , , | |
| 5 | MTAZ02 | Tape | MTAZ0362801 | COMPLEX LG-P520 CISBK ZZ:Without Color COMPLEX, (empty), , , , , | |
| 4 | FAB010000 | Screw,Machine | GMEY0010402 | GMEY0010402 BH + 1.4mM 2mM MSWR FZB N - SERVEONE CO., LTD. | |
| 4 | FAB010001 | Screw,Machine | GMEY0012901 | GMEY0012901 FH + 1.4mM 2.5mM MSWR NI PLT N - LG ELECTRONICS INC. | |
| 4 | MBG000001 | Button | MBJZ0042602 | COMPLEX LG-P520 CISBK ZZ:Without Color COMPLEX, (empty), , , , , | |
| 4 | MBG000000 | Button | MBJZ0042801 | COMPLEX LG-P520 CISBK ZZ:Without Color MAIN | |
| 4 | MCQ000002 | Damper | MCQ66471301 | COMPLEX LGP520.ACISBK ZZ:Without Color DAMPER(LCD_FRONT) | |
| 4 | MCQ000000 | Damper | MCQ66487901 | COMPLEX LGP520.ACISRD ZZ:Without Color - | |
| 4 | MDJ000000 | Filter | MFBZ0027401 | COMPLEX LG-P520 CISBK ZZ:Without Color COMPLEX, (empty), , , , , | |
| 4 | MDS000000 | Gasket | MGAZ0113301 | COMPLEX LG-P520 CISBK ZZ:Without Color COMPLEX,(empty), | |
| 4 | MCQ000001 | Damper | MPBZ0345201 | COMPLEX LG-P520 CISBK ZZ:Without Color COMPLEX, (empty), , , , , | |
| 4 | MJN061100 | Tape,Protect | MTAB0428601 | COMPLEX LG-P520 CISBK ZZ:Without Color COMPLEX, (empty), , , , , | |

# 12. EXPLODED VIEW & REPLACEMENT PART LIST

| Level | Location No. | Description | Part Number | Spec | Remark |
|---|---|---|---|---|---|
| 4 | MJN061101 | Tape,Protect | MTAB0429701 | COMPLEX LG-P520 CISBK ZZ:Without Color COMPLEX, (empty), , , , , | |
| 4 | MJN061102 | Tape,Protect | MTAB0453001 | COMPLEX LG-P520 CISBK ZZ:Without Color COMPLEX,(empty), | |
| 4 | MKC043300 | Window,LCD | MWAC0152701 | COMPLEX LG-P520 CISBK ZZ:Without Color MOLD, PC LUPOY SC-1004A, , , , , | |
| 3 | GMZZ00 | Screw,Machine | GMZZ0017701 | GMZZ0017701 BH + 1.4mM 3mM MSWR NI PLT N - ASIA BOLT | |
| 4 | MCQ000002 | Damper | MCQ66467201 | COMPLEX LGP520.ACISRD ZZ:Without Color - | |
| 4 | MPBZ00 | Damper | MPBZ0344801 | COMPLEX LG-P520 CISBK ZZ:Without Color COMPLEX, (empty), , , , , | |
| 4 | MCQ000001 | Damper | MPBZ0344901 | COMPLEX LG-P520 CISBK ZZ:Without Color COMPLEX, (empty), , , , , | |
| 4 | MJN000000 | Tape | MTAZ0352401 | COMPLEX LG-P520 CISBK ZZ:Without Color COMPLEX, (empty), , , , , | |
| 5 | ACKA00 | Can Assembly, Shield | ACKA0033601☞ 8 | LG-P520 CISBK ZZ:Without Color - | |
| 6 | MCBA00 | Can,Shield | MCBA0087401 | COMPLEX LG-P520 CISBK ZZ:Without Color PRESS,STS, | |
| 6 | MCQ000002 | Damper | MCQ66499101 | COMPLEX LGP520.ACISBK ZZ:Without Color - | |
| 6 | MKU101700 | Absorber,Electromagnetic Wave | MKU30223401 | COMPLEX LGP520.ACISBK ZZ:Without Color - | |
| 6 | MKU101701 | Absorber,Electromagnetic Wave | MKU30243401 | COMPLEX LGP520.ACISBK ZZ:Without Color P520_ABSORBER2_CAN_SHIELD | |
| 6 | MLAB | Label,After Service | MLAB0001102 | COMPLEX C2000 CGRSV WA:White C2000 USASV DIA 4.0 PRINTING, | |
| 6 | MCQ000000 | Damper | MPBZ0360701 | COMPLEX LG-P520 BALBK ZZ:Without Color COMPLEX, (empty), , , , , | |
| 6 | MCQ000001 | Damper | MPBZ0367101 | COMPLEX LG-P520 CISBK ZZ:Without Color COMPLEX,(empty), | |
| 6 | MTAZ01 | Tape | MTAZ0352801 | COMPLEX LG-P520 CISBK ZZ:Without Color COMPLEX, (empty), , , , , | |
| 5 | ADCA00 | Dome Assembly, Metal | ADCA0119001 | LG-P520 CISBK ZZ:Without Color - | |
| 5 | MCQ000000 | Damper | MCQ66467901 | COMPLEX LGP520.ACISRD ZZ:Without Color - | |
| 5 | MCQ000001 | Damper | MCQ66468001 | COMPLEX LGP520.ACISRD ZZ:Without Color - | |
| 5 | MEZ000900 | Label,After Service | MLAB0004801 | COMPLEX LG-LB3300 LGT ZZ:Without Color - | |
| 5 | MJN000000 | Tape | MTAZ0362101 | COMPLEX LG-P520 BALBK ZZ:Without Color COMPLEX, (empty), , , , , | |
| 5 | MEZ000000 | Label | MLAZ0038301 | COMPLEX LG-VX6000 ZZ:Without Color PID Label 4 Array PRINTING, | |

## 12.2 Replacement Parts <Main component>

**Note**: This Chapter is used for reference, Part order is ordered by SBOM standard on GCSC

| Level | Location No. | Description | Part Number | Spec | Remark |
|---|---|---|---|---|---|
| 4 | EAA010400 | Antenna,Helical | SNGF0065401 | LS01-I-10LGP520-A0 3,-2 dBd,Quad(GSM850/900/DCS/PCS),QUAD,-2,50,3 LS Mtron Ltd. | |
| 4 | EAJ020200 | LCD,Module-TFT | SVLM0040002 | LM283DN1A Main,2.8,QVGA,47.4x70.21x1.9t,262K,TFT,TM,RENESAS(R 61520), TOVIS | |
| 3 | SACY00 | PCB Assembly,Flexible | SACY0119901☞ 6 | LG-P520 CISBK FLEXIBLE 1.0 | |
| 4 | SACE00 | PCB Assembly, Flexible,SMT | SACE0108201☞ 3 | LG-P520 CISBK FLEXIBLE 1.0 | |
| 5 | SACC00 | PCB Assembly, Flexible,SMT Bottom | SACC0081401☞ 8 | LG-P520 CISBK FLEXIBLE 1.0 | |
| 6 | C104,C105 | Capacitor,Ceramic, Chip | ECCH0000115 | MCH155A220JK 22pF 5% 50V NP0 -55TO+125C 1005 R/TP - ROHM Semiconductor KOREA CORPORATION | |
| 6 | C106,C107, C108 | Capacitor,Ceramic, Chip | ECZH0003103 | GRM36X7R104K10PT 100nF 10% 10V X7R -55TO+125C 1005 R/TP - MURATA MANUFACTURING CO.,LTD. | |
| 6 | CN100 | Connector,BtoB | ENBY0035901 | GB042-40P-H10-E3000 40P 0.4MM STRAIGHT PLUG SMD R/TP 1M - LS Mtron Ltd. | |
| 6 | S100 | Card Socket | ENSY0022201 | CAM-H88 24,ETC,mm,7*7,1.3M (1/5") Socket Type MITSUMI ELECTRIC CO.,LTD. | |
| 6 | S101 | Card Socket | ENSY0025301 | KP09Y-12S-1.27SF SIM 12P ANGLE SMD R/TP - HIROSE KOREA CO.,LTD | |
| 6 | R101,R102 | Resistor,Chip | ERHY0000254 | MCR01MZP5J472 4.7KOHM 5% 1/16W 1005 R/TP - ROHM Semiconductor KOREA CORPORATION | |
| 6 | R106 | Resistor,Chip | ERHZ0000406 | MCR01MZP5J104 100KOHM 5% 1/16W 1005 R/TP - ROHM Semiconductor KOREA CORPORATION | |
| 6 | R100,R103, R104 | Resistor,Chip | ERHZ0000441 | MCR01MZP5J220 22OHM 5% 1/16W 1005 R/TP - ROHM Semiconductor KOREA CORPORATION | |
| 5 | SACD00 | PCB Assembly, Flexible,SMT Top | SACD0094901 | LG-P520 CISBK FLEXIBLE,A | |
| 5 | SPCY00 | PCB,Flexible | SPCY0247201 | SPCY0247201 LG-P520 CISBK,FLEXIBLE,E,POLYI,.26 mm,MULTI-3,F_SUB SI FLEX CO., LTD | |
| 4 | SVCY00 | Camera Module | SVCY0021101 | HSIS-LM23SS CMOS,MEGA,2M FF SS-LSI(1/5"),7x7x4.1,Socket HANSUNG ELCOMTEC CO.,LTD. | |
| 3 | SAFY00 | PCB Assembly,Main | SAFY0383001☞ 2 | LGP520.ACISBK MAIN 1.0 | |
| 4 | SAFB00 | PCB Assembly, Main,Insert | SAFB0123201☞ 10 | LGP520.ACISBK MAIN 1.0 | |
| 5 | SJMY00 | Motor,DC | SJMY0007117 | WHVM-1030Q15 2 V,65 mA,10*3.0t,3V, WOOSUNG G&T CO.,LTD | |

# 12. EXPLODED VIEW & REPLACEMENT PART LIST

| Level | Location No. | Description | Part Number | Spec | Remark |
|---|---|---|---|---|---|
| 5 | EAX010500 | PCB,Sidekey | SPKY0094401 | SPKY0094401 LG-P520 CISBK,SIDEKEY,C,POLYI,0.62 mm,MULTI-2,F_SK_HOLD SI FLEX CO., LTD | |
| 5 | EAX010501 | PCB,Sidekey | SPKY0094501 | SPKY0094501 LG-P520 CISBK,SIDEKEY,B,POLYI,0.62 mm,MULTI-2,F_SK_VOL SI FLEX CO., LTD | |
| 5 | SUSY00 | Speaker,Dual Mode | SUSY0028906 | ISDT-181230-08W-01 Nd-Fe-B 700mW 8OHM 91DB 710HZ 1812*3.0T WIRE GoerTek Inc. | |
| 4 | SAFF00 | PCB Assembly, Main,SMT | SAFF0285001☞ 3 | LGP520.ACISBK MAIN 1.0 | |
| 5 | SAFC00 | PCB Assembly, Main,SMT Bottom | SAFC0152801☞ 140 | LGP520.ACISBK MAIN 1.0 | |
| 6 | C317,C321 | Capacitor,Ceramic, Chip | ECCH0000105 | MCH155A040C 4pF 0.25PF 50V NP0 -55TO+125C 1005 R/TP - ROHM Semiconductor KOREA CORPORATION | |
| 6 | C602,C607 | Capacitor,Ceramic, Chip | ECCH0000110 | MCH155A100D 10pF 0.25PF 50V NP0 -55TO+125C 1005 R/TP - ROHM Semiconductor KOREA CORPORATION | |
| 6 | C262 | Capacitor,Ceramic, Chip | ECCH0000112 | MCH155C150J 15pF 5% 50V NP0 -55TO+125C 1005 R/TP - ROHM Semiconductor KOREA CORPORATION | |
| 6 | C101,C401 | Capacitor,Ceramic, Chip | ECCH0000113 | MCH155A180J 18pF 5% 50V NP0 -55TO+125C 1005 R/TP - ROHM Semiconductor KOREA CORPORATION | |
| 6 | C142,C143, C207,C210, C441,C442 | Capacitor,Ceramic, Chip | ECCH0000115 | MCH155A220JK 22pF 5% 50V NP0 -55TO+125C 1005 R/TP - ROHM Semiconductor KOREA CORPORATION | |
| 6 | C144,C203, C211,C215, C216 | Capacitor,Ceramic, Chip | ECCH0000117 | CL05C270JB5NNNC 27pF 5% 50V NP0 -55TO+125C 1005 R/TP 0.5 SAMSUNG ELECTRO-MECHANICS CO., LTD. | |
| 6 | C206,C233, C234,C241, C243,C259, C305,C331 | Capacitor,Ceramic, Chip | ECCH0000120 | MCH155A390J 39pF 5% 50V NP0 -55TO+125C 1005 R/TP - ROHM Semiconductor KOREA CORPORATION | |
| 6 | C135,C136, C137,C138, C228,C229, C264,C265, C432,C433, C434,C435 | Capacitor,Ceramic, Chip | ECCH0000122 | MCH155A470JK 47pF 5% 50V NP0 -55TO+125C 1005 R/TP - ROHM Semiconductor KOREA CORPORATION | |
| 6 | C212 | Capacitor,Ceramic, Chip | ECCH0000129 | MCH155A121JK 120pF 5% 50V NP0 -55TO+125C 1005 R/TP - ROHM Semiconductor KOREA CORPORATION | |
| 6 | C139,C213, C302,C303, C304,C306, C328,C329, C330,C332, C614,C615, C639 | Capacitor,Ceramic, Chip | ECCH0000143 | MCH155CN102KK 1nF 10% 50V X7R -55TO+125C 1005 R/TP - ROHM Semiconductor KOREA CORPORATION | |
| 6 | C103,C128, C403 | Capacitor,Ceramic, Chip | ECCH0000151 | CL05B472KB5NNNC 4.7nF 10% 25V X7R -55TO+125C 1005 R/TP - SAMSUNG ELECTRO-MECHANICS CO., LTD. | |
| 6 | C217,C531, C600,C604, C605 | Capacitor,Ceramic, Chip | ECCH0000155 | MCH153CN103KK 10nF 10% 16V X7R -55TO+125C 1005 R/TP - ROHM Semiconductor KOREA CORPORATION | |

| Level | Location No. | Description | Part Number | Spec | Remark |
|---|---|---|---|---|---|
| 6 | C335 | Capacitor,Ceramic, Chip | ECCH0000161 | MCH153CN333KK 33nF 10% 16V X7R -55TO+125C 1005 R/TP - ROHM Semiconductor KOREA CORPORATION | |
| 6 | C204,C209 | Capacitor,Ceramic, Chip | ECCH0000179 | GRM155R71C223K 22nF 10% 16V X7R -55TO+85C 1005 R/TP - MURATA MANUFACTURING CO.,LTD. | |
| 6 | C246,C255 | Capacitor,Ceramic, Chip | ECCH0000182 | GRM155R61A104K 0.1uF 10% 10V X5R -55TO+85C 1005 R/TP - MURATA MANUFACTURING CO.,LTD. | |
| 6 | C343,C344 | Capacitor,Ceramic, Chip | ECCH0000185 | GRM1555C1H5R6C 5.6pF 0.25PF 50V NP0 -55TO+125C 1005 R/TP - MURATA MANUFACTURING CO.,LTD. | |
| 6 | C208,C227, C230,C231, C238,C245, C445,C523, C525,C526, C603 | Capacitor,Ceramic, Chip | ECCH0000198 | CL05A225MQ5NSNC 2.2uF 20% 6.3V X5R -55TO+85C 1005 R/TP . SAMSUNG ELECTRO-MECHANICS CO., LTD. | |
| 6 | C636 | Capacitor,Ceramic, Chip | ECCH0000701 | C1005C0G1H1R2CT000F 1.2pF 0.25PF 50V NP0 - 55TO+125C 1005 R/TP - TDK CORPORATION | |
| 6 | C308 | Capacitor,Ceramic, Chip | ECCH0000901 | C1005C0G1H2R2CT000F 2.2pF 0.25PF 50V NP0 - 55TO+125C 1005 R/TP - TDK KOREA COOPERATION | |
| 6 | C322,C323, C345,C346 | Capacitor,Ceramic, Chip | ECCH0001001 | C1005C0G1H6R8CT000F 6.8pF 0.5PF 50V NP0 - 55TO+125C 1005 R/TP - TDK KOREA COOPERATION | |
| 6 | C225,C226 | Capacitor,Ceramic, Chip | ECCH0002001 | C1005JB0J104KT000F 0.1uF 10% 6.3V Y5P -30TO+85C 1005 R/TP - TDK CORPORATION | |
| 6 | C104,C105, C404,C405 | Capacitor,Ceramic, Chip | ECCH0002002 | C1005X7R1A473KT000F 47000pF 10% 10V Y5P - 30TO+85C 1005 R/TP - TDK CORPORATION | |
| 6 | C100,C106, C249,C324, C400,C406, C421,C422, C424,C438, C440,C444, C500,C502, C529,C637, C638 | Capacitor,Ceramic, Chip | ECCH0004904 | GRM155R60J105K 1uF 10% 6.3V X5R -55TO+85C 1005 R/TP - MURATA MANUFACTURING CO.,LTD. | |
| 6 | C244 | Capacitor,Ceramic, Chip | ECCH0005603 | GRM188R61A225K 2.2uF 10% 10V X5R -55TO+85C 1608 R/TP - MURATA MANUFACTURING CO.,LTD. | |
| 6 | C205 | Capacitor,Ceramic, Chip | ECCH0005604 | GRM188R60J106M 10000000 pF,6.3V,M,X5R,TC,1608,R/TP,0.8 mm MURATA MANUFACTURING CO.,LTD. | |
| 6 | C127,C423 | Capacitor,Ceramic, Chip | ECCH0007803 | CL10A106MP8NNNC 10uF 20% 10V X5R -55TO+85C 1608 R/TP 0.8MM SAMSUNG ELECTRO-MECHANICS CO., LTD. | |
| 6 | C111,C118, C123,C124, C218,C235, C236,C239, C240,C411, C418,C501, C517,C518, C528 | Capacitor,Ceramic, Chip | ECCH0007804 | CL05A225MP5NSNC 2.2uF 20% 10V X5R -55TO+85C 1005 R/TP 0.5MM SAMSUNG ELECTRO-MECHANICS CO., LTD. | |

| Level | Location No. | Description | Part Number | Spec | Remark |
|---|---|---|---|---|---|
| 6 | C662 | Capacitor,TA,Conformal | ECTH0002703 | TCTAL1A107M8R 0.0001F 20% 10V 50UA -55TO+125C 0OHM 3.2x1.6x1.1 NONE SMD R/TP ROHM CO.,LTD. | |
| 6 | C310,C337 | Capacitor,TA,Conformal | ECTH0005703 | 251M1002226MR0S 22F 20% 10V 2.2A -55TO+85C 4OHM 2.2X1.25X0.9MM - SMD R/TP MATSUO ELECTRIC CO.,LTD | |
| 6 | C300,C312, C313,C338, C339 | Capacitor,Ceramic, Chip | ECZH0000802 | C1005C0G1H010CT 1pF 0.25PF 50V NP0 -55TO+125C 1005 R/TP - TDK KOREA COOPERATION | |
| 6 | C145,C611, C640,L323 | Capacitor,Ceramic, Chip | ECZH0000813 | C1005C0G1H101JT 100pF 5% 50V NP0 -55TO+125C 1005 R/TP - TDK KOREA COOPERATION | |
| 6 | C251,C253, C254,C309 | Capacitor,Ceramic, Chip | ECZH0000830 | C1005C0G1H330JT000F 33pF 5% 50V NP0 -55TO+125C 1005 R/TP - TDK KOREA COOPERATION | |
| 6 | C214 | Capacitor,Ceramic, Chip | ECZH0000901 | C1005C0G1H240JT000F 24pF 5% 50V NP0 -55TO+125C 1005 R/TP - TDK KOREA COOPERATION | |
| 6 | C325,C341, C349 | Capacitor,Ceramic, Chip | ECZH0001002 | C1005CH1H0R5BT000F 0.5pF 0.1PF 50V NP0 -55TO+125C 1005 R/TP - TDK KOREA COOPERATION | |
| 6 | C110,C410 | Capacitor,Ceramic, Chip | ECZH0001210 | C1005Y5V1A474ZT000F 470nF -20TO+80% 10V Y5V -30TO+85C 1005 R/TP - TDK KOREA COOPERATION | |
| 6 | C219,C221, C222,C223, C224,C247, C248,C252, C509,C513, C515,C516, C524 | Capacitor,Ceramic, Chip | ECZH0001215 | C1005X5R1A105KT000F 1uF 10% 10V X5R -55TO+85C 1005 R/TP - TDK KOREA COOPERATION | |
| 6 | C102,C116, C140,C402, C416,C436 | Capacitor,Ceramic, Chip | ECZH0001216 | C1005X5R1A224KT000E 220nF 10% 10V X5R -55TO+85C 1005 R/TP - TDK KOREA COOPERATION | |
| 6 | C113,C114, C326,C334, C413,C414 | Capacitor,Ceramic, Chip | ECZH0001217 | GRM155R60J474K 470nF 10% 6.3V X5R -25TO+70C 1005 BK-DUP - MURATA MANUFACTURING CO.,LTD. | |
| 6 | C107,C108, C109,C112, C115,C117, C119,C125, C126,C130, C200,C220, C232,C237, C258,C261, C336,C407, C408,C409, C412,C415, C417,C427, C439,C443, C530,C532, C609 | Capacitor,Ceramic, Chip | ECZH0003103 | GRM36X7R104K10PT 100nF 10% 10V X7R -55TO+125C 1005 R/TP - MURATA MANUFACTURING CO.,LTD. | |
| 6 | C256 | Capacitor,Ceramic, Chip | ECZH0003503 | GRM188R61E105K 1uF 10% 25V X5R -55TO+85C 1608 R/TP - MURATA MANUFACTURING CO.,LTD. | |
| 6 | C201 | Capacitor,Ceramic, Chip | ECZH0003504 | GRM188R71E104K 100nF 10% 25V X7R -55TO+125C 1608 R/TP - MURATA MANUFACTURING CO.,LTD. | |

| Level | Location No. | Description | Part Number | Spec | Remark |
|---|---|---|---|---|---|
| 6 | C121,C419 | Capacitor,Ceramic, Chip | ECZH0025502 | GRM219R60J226M 0.000022F 20% 6.3V X5R -55TO+85C 2012 R/TP 0.85MM MURATA MANUFACTURING CO.,LTD. | |
| 6 | VA300 | Diode,TVS | EDTY0008606 | PRSB6.8C 4.7V 5.7 - - 10W - R/TP 2P 1 PROTEK DEVICES INC. | |
| 6 | ZD1,ZD2,ZD 3,ZD4 | Diode,TVS | EDTY0009101 | ESD9X5.0ST5G 5V 6.2 12.3V 8.7A 107W SOD528 R/TP 2P 1 ON SEMICONDUCTOR | |
| 6 | ZD200, ZD501, ZD502, ZD503, ZD504, ZD505, ZD506, ZD507, ZD508 | Diode,TVS | EDTY0009401 | VMNZ6.8CST2R 5.5V 0 10V 0A 200mW SC70 R/TP 6P 5 ROHM. | |
| 6 | C514 | Diode,TVS | EDTY0009601 | Rclamp0521P.TCT 5V 6 5V 4A 100W - R/TP 2P 1 SEMTECH CORPORATION | |
| 6 | L305,L306, L317,L318 | Inductor,Multilayer, Chip | ELCH0001033 | HK1005 1N5S-T 1.5NH 0.3NH 0V 8A 13GOHM 50mHZ 300m NON SHIELD 1 1.0X0.5X0.5MM R/TP TAIYO YUDEN CO.,LTD | |
| 6 | R315 | Inductor,Multilayer, Chip | ELCH0001035 | HK1005 4N7S-T 4.7NH 0.3NH 0V 8A 6GOHM 120mHZ 300m NON SHIELD 1 1.0X0.5X0.5MM R/TP TAIYO YUDEN CO.,LTD | |
| 6 | L311 | Inductor,Multilayer, Chip | ELCH0001036 | HK1005 5N6S-T 5.6NH 0.3NH 0V 8A 5.7GOHM 150mHZ 300m NON SHIELD 1 1.0X0.5X0.5MM R/TP TAIYO YUDEN CO.,LTD | |
| 6 | C340 | Inductor,Multilayer, Chip | ELCH0001040 | HK1005 3N9S-T 3.9NH 0.3NH 0V 8A 7GOHM 120mHZ 300m NON SHIELD 1 1.0X0.5X0.5MM R/TP TAIYO YUDEN CO.,LTD | |
| 6 | C314 | Inductor,Multilayer, Chip | ELCH0001403 | LL1005-FHL1N0S 1NH 0.3NH 0V 500mA 0.1OHM 20GHZ 8 NON SHIELD 1 1.0X0.5X0.5MM R/TP TOKO, INC. | |
| 6 | L320 | Inductor,Multilayer, Chip | ELCH0001406 | LL1005-FHL4N7S 4.7NH 0.3NH 0V 400mA 0.2OHM 6GHZ 9 NON SHIELD 1 1.0X0.5X0.5MM R/TP TOKO, INC. | |
| 6 | L319 | Inductor,Multilayer, Chip | ELCH0003814 | LQG15HS5N1S02 5.1NH 0.3NH 0V 300mA 0.2OHM 5.3GHZ 8 NON SHIELD 1 1.0X0.5X0.5MM R/TP MURATA MANUFACTURING CO.,LTD. | |
| 6 | L310 | Inductor,Multilayer, Chip | ELCH0003819 | LQG15HS12NJ02D 12NH 5% 0V 300mA 0.28OHM 3GHZ 8 NON SHIELD 1 1.0X0.5X0.5MM R/TP MURATA MANUFACTURING CO.,LTD. | |
| 6 | L301,L302, L303,L304, L313,L314, L315,L316 | Inductor,Multilayer, Chip | ELCH0003826 | LQG15HS3N3S02D 3.3NH 0.3NH 0V 300mA 0.17OHM 6GHZ 8 NON SHIELD 1 1.0X0.5X0.5MM R/TP MURATA MANUFACTURING CO.,LTD. | |
| 6 | L307,L312 | Inductor,Multilayer, Chip | ELCH0003836 | LQG15HS5N6S02 5.6NH 0.3NH - 300mA 0.12OHM 6KHZ 8 SHIELD 1 1.0X0.5X0.55MM R/TP MURATA MANUFACTURING CO.,LTD. | |
| 6 | L200,L201 | Inductor,Multilayer, Chip | ELCH0003842 | LQG15HSR10J02 100NH 5% - 150mA 1.25OHM 600HZ 8 SHIELD 1 1.0X0.5X0.55MM R/TP MURATA MANUFACTURING CO.,LTD. | |

# 12. EXPLODED VIEW & REPLACEMENT PART LIST

| Level | Location No. | Description | Part Number | Spec | Remark |
|---|---|---|---|---|---|
| 6 | L322 | Inductor,Multilayer, Chip | ELCH0004710 | 1005GC2T15NJ00 15NH 5% 0V 250mA 0.53OHM 2GHZ 8 NON SHIELD 1 1.0X0.5X0.5MM R/TP PILKOR ELECTRONICS LTD. | |
| 6 | L308 | Inductor,Multilayer, Chip | ELCH0004733 | 1005GC2T4N3SLF 4.3NH 0.3NH 0V 300mA 0.23OHM 3.5GHZ 8 NON SHIELD 1 1.0X0.5X0.5MM R/TP PILKOR ELECTRONICS LTD. | |
| 6 | L500,L501 | Inductor,Multilayer, Chip | ELCH0009114 | 0402CS-R10XJEW 100NH 5% 0V 30mA 2OHM 1.16GHZ 21 NON SHIELD 1 1.19X0.64X0.66MM R/TP COILCRAFT SINGAPORE PTE LTD. | |
| 6 | L202,L203 | Inductor,Multilayer, Chip | ELCH0012503 | LQW15AN56NJ00 56NH 5% 0V 200mA 1.17OHM 2.8GHZ 25 NON SHIELD 1 1.0X0.5X0.5MM R/TP MURATA MANUFACTURING CO.,LTD. | |
| 6 | L100,L400 | Inductor,Wire Wound, Chip | ELCP0008003 | MIP2520D3R3M 3.3UH 30% 0V 1.2A 0.1OHM 0HZ 0 SHIELD 2.5X2X1MM NONE R/TP FDK CORPORATION. | |
| 6 | CN203, CN500 | Connector,BtoB | ENBY0036001 | GB042-40S-H10-E3000 40P 0.4MM STRAIGHT SOCKET SMD R/TP 1M ENGINEERING PLASTIC UL94V-0 AU OVER NI LS Mtron Ltd. | |
| 6 | CN200 | connector,I/O | ENRY0008801 | GU073-5P-SD-E1500 GU073-5P-SD-E1500,5,mm,ANGLE LS Mtron Ltd. | |
| 6 | S502 | Card Socket | ENSY0023302 | SCHA5B0501 8,ETC,0.7 mm,15.0x15.0x1.62t,Reverse ALPS ELECTRIC CO.,LTD. | |
| 6 | SW300, SW301 | Connector,RF | ENWY0008701 | MS-156C NONE STRAIGHT SOCKET SMD T/REEL AU 50OHM 400mDB HIROSE KOREA CO.,LTD | |
| 6 | CN202 | Connector, Terminal Block | ENZY0028601 | 04-9248-003-017-829+ 3P 2.50MM STRAIGHT SMD R/TP - KYOCERA ELCO KOREA SALES CO.,LTD. | |
| 6 | Q400 | TR,Array | EQBA0000602 | KRX102E NPN/PNP 40 30 6 0.1 0.2 TESV R/TP 5P 2 KEC CORPORAITION | |
| 6 | Q300 | TR,Bipolar | EQBN0019201 | KTC3770V VSM,0.1 W,R/TP,1.2*1.2*0.5 Vcbo=20,Vceo=12,Vebo=2V,Ic=100mA KEC CORPORAITION | |
| 6 | Q100 | TR,Bipolar | EQBN0020501 | KTC4075E NPN 5V 60V 50V 150mA 100NA 700 100mW ESM R/TP 3P KEC CORPORAITION | |
| 6 | R236 | Resistor,Chip | ERHY0000105 | MCR01MZP5F51R0 51OHM 1% 1/16W 1005 R/TP - ROHM Semiconductor KOREA CORPORATION | |
| 6 | R601 | Resistor,Chip | ERHY0000128 | MCR01MZP5F1502 15KOHM 1% 1/16W 1005 R/TP - ROHM Semiconductor KOREA CORPORATION | |
| 6 | R233 | Resistor,Chip | ERHY0000161 | MCR01MZP5F2003 200KOHM 1% 1/16W 1005 R/TP - ROHM Semiconductor KOREA CORPORATION | |
| 6 | R231 | Resistor,Chip | ERHY0000185 | MCR01MZP5F8200 820OHM 1% 1/16W 1005 R/TP - ROHM. | |
| 6 | R203,R205 | Resistor,Chip | ERHY0000193 | MCR01MZSJ270 27 ohm,1/16W,F,1005,R/TP ROHM. | |
| 6 | R132,R223 | Resistor,Chip | ERHY0000241 | MCR01MZP5J102 1KOHM 5% 1/16W 1005 R/TP - ROHM Semiconductor KOREA CORPORATION | |
| 6 | R106,R517 | Resistor,Chip | ERHY0000254 | MCR01MZP5J472 4.7KOHM 5% 1/16W 1005 R/TP - ROHM Semiconductor KOREA CORPORATION | |
| 6 | R103 | Resistor,Chip | ERHY0000275 | MCR01MZP5J563 56KOHM 5% 1/16W 1005 R/TP - ROHM Semiconductor KOREA CORPORATION | |

| Level | Location No. | Description | Part Number | Spec | Remark |
|---|---|---|---|---|---|
| 6 | R505 | Resistor,Chip | ERHY0003301 | MCR01MZP5J101 100OHM 5% 1/16W 1005 R/TP - ROHM. | |
| 6 | R211,R214, R228 | Resistor,Chip | ERHZ0000201 | MCR01MZP5F1000 100OHM 1% 1/16W 1005 R/TP - ROHM Semiconductor KOREA CORPORATION | |
| 6 | R401,R402 | Resistor,Chip | ERHZ0000203 | MCR01MZP5F1002 10KOHM 1% 1/16W 1005 R/TP - ROHM Semiconductor KOREA CORPORATION | |
| 6 | R111,R225, R506 | Resistor,Chip | ERHZ0000204 | MCR01MZP5F1003 100KOHM 1% 1/16W 1005 R/TP - ROHM Semiconductor KOREA CORPORATION | |
| 6 | R229 | Resistor,Chip | ERHZ0000206 | MCR01MZP5F10R0 10OHM 0.1% 1/16W 1005 R/TP - ROHM Semiconductor KOREA CORPORATION | |
| 6 | R232 | Resistor,Chip | ERHZ0000236 | MCR01MZP5F2001 2KOHM 1% 1/16W 1005 R/TP - ROHM Semiconductor KOREA CORPORATION | |
| 6 | R209,R210 | Resistor,Chip | ERHZ0000240 | MCR01MZP5F20R0 20OHM 1% 1/16W 1005 R/TP - ROHM Semiconductor KOREA CORPORATION | |
| 6 | R118,R120, R144,R600 | Resistor,Chip | ERHZ0000401 | MCR01MZSJ000 0OHM 5% 1/16W 1005 R/TP - ROHM Semiconductor KOREA CORPORATION | |
| 6 | R102,R220, R222 | Resistor,Chip | ERHZ0000402 | MCR01MZP5J100 10OHM 5% 1/16W 1005 R/TP - ROHM Semiconductor KOREA CORPORATION | |
| 6 | R306,R329 | Resistor,Chip | ERHZ0000404 | MCR01MZP5J102 1KOHM 5% 1/16W 1005 R/TP - ROHM Semiconductor KOREA CORPORATION | |
| 6 | R202,R515 | Resistor,Chip | ERHZ0000405 | MCR01MZP5J103 10KOHM 5% 1/16W 1005 R/TP - ROHM Semiconductor KOREA CORPORATION | |
| 6 | R105,R109, R124,R125, R126,R135, R212,R213, R224,R226, R230,R403, R404,R407, R418,R427, R433,R434, R435,R503, R522 | Resistor,Chip | ERHZ0000406 | MCR01MZP5J104 100KOHM 5% 1/16W 1005 R/TP - ROHM Semiconductor KOREA CORPORATION | |
| 6 | R304,R307, R308,R309, R328,R330, R331,R332 | Resistor,Chip | ERHZ0000408 | MCR01MZP5J111 110OHM 5% 1/16W 1005 R/TP - ROHM Semiconductor KOREA CORPORATION | |
| 6 | R314,R500, R520,R521 | Resistor,Chip | ERHZ0000434 | MCR01MZP5J1R0 1OHM 5% 1/16W 1005 R/TP - ROHM Semiconductor KOREA CORPORATION | |
| 6 | R127,R128, R201,R204, R206 | Resistor,Chip | ERHZ0000443 | MCR01MZP5J222 2.2KOHM 5% 1/16W 1005 R/TP - ROHM Semiconductor KOREA CORPORATION | |
| 6 | R324 | Resistor,Chip | ERHZ0000449 | MCR01MZP5J243 24KOHM 5% 1/16W 1005 R/TP - ROHM Semiconductor KOREA CORPORATION | |
| 6 | R237 | Resistor,Chip | ERHZ0000457 | MCR01MZP5J300 30OHM 5% 1/16W 1005 R/TP - ROHM Semiconductor KOREA CORPORATION | |
| 6 | R325 | Resistor,Chip | ERHZ0000473 | MCR01MZP5J390 39OHM 5% 1/16W 1005 R/TP - ROHM Semiconductor KOREA CORPORATION | |

# 12. EXPLODED VIEW & REPLACEMENT PART LIST

| Level | Location No. | Description | Part Number | Spec | Remark |
|---|---|---|---|---|---|
| 6 | R108 | Resistor,Chip | ERHZ0000475 | MCR01MZP5J392 3.9KOHM 5% 1/16W 1005 R/TP - ROHM Semiconductor KOREA CORPORATION | |
| 6 | R107 | Resistor,Chip | ERHZ0000484 | MCR01MZP5J471 470OHM 5% 1/16W 1005 R/TP - ROHM Semiconductor KOREA CORPORATION | |
| 6 | R333 | Resistor,Chip | ERHZ0000485 | MCR01MZP5J472 4.7KOHM 5% 1/16W 1005 R/TP - ROHM Semiconductor KOREA CORPORATION | |
| 6 | R508,R509, R510,R511, R512 | Resistor,Chip | ERHZ0000486 | MCR01MZP5J473 47KOHM 5% 1/16W 1005 R/TP - ROHM Semiconductor KOREA CORPORATION | |
| 6 | R113,R420 | Resistor,Chip | ERHZ0000499 | MCR01MZP5J562 5.6KOHM 5% 1/16W 1005 R/TP - ROHM Semiconductor KOREA CORPORATION | |
| 6 | R523,R524, R525 | Resistor,Chip | ERHZ0000505 | MCR01MZP5J681 680OHM 5% 1/16W 1005 R/TP - ROHM Semiconductor KOREA CORPORATION | |
| 6 | R624 | Resistor,Chip | ERHZ0000506 | MCR01MZP5J682 6.8KOHM 5% 1/16W 1005 R/TP - ROHM Semiconductor KOREA CORPORATION | |
| 6 | R591,R592, R593,R594, R595 | Resistor,Chip | ERHZ0000510 | MCR01MZP5J751 750OHM 5% 1/16W 1005 R/TP - ROHM Semiconductor KOREA CORPORATION | |
| 6 | R321 | Resistor,Chip | ERHZ0003801 | MCR01MZP5J5R1 5.1OHM 5% 1/16W 1005 R/TP - ROHM Semiconductor KOREA CORPORATION | |
| 6 | U207,U208 | IC,Analog Switch | EUSY0300101 | NLAS5223BMNR2G 1.65~5.5 50SEC 30SEC 0W TQFN R/TP 10P 2 - ON SEMICONDUCTOR | |
| 6 | U201,U205, U206 | IC,Analog Switch | EUSY0340301 | FSA2268TUMX-F113 1.65~4.3 60SEC 35SEC 0W MLF R/TP 10P 2 - FAIRCHILD SEMICONDUCTOR | |
| 6 | U601 | IC,Analog Switch | EUSY0342401 | NLAST9431MT 2.0~5.5 16SEC 5SEC 0W TDFN R/TP 16P 4 - ON SEMICONDUCTOR | |
| 6 | U500 | IC,Charge Pump | EUSY0344403 | RT9396GQW QFN,24,R/TP,4CH+2LDO,IC,Sub PMICIC,Sub PMIC RICHTEK TECHNOLOGY CORP. | |
| 6 | U400 | IC,Buffer | EUSY0396101 | IDT70P255 128KB Asynchronous Dual Port SRAM,100,R/TP,BGA Package,IC,BufferIC,Buffer IDT INC. | |
| 6 | U202 | IC,Audio Sub System | EUSY0403901 | WM9093ECS/R 1.71~5.5V 0W WLCSP R/TP 20P - WOLFSON MICROELECTRONICS PLC | |
| 6 | U200 | IC,Analog Multiplexer | EUSY0406901 | RT8962WS WLCSP,20,R/TP,MUIC-Basic,2X2.5,IC,Analog SwitchIC,Analog Switch RICHTEK TECHNOLOGY CORP. | |
| 6 | U203,U204 | IC,LDO Voltage Regulator | EUSY0407501 | BU18TD4WNVX SSON004,4,R/TP,1.8V 150mA Single LDO,IC,LDO Voltage RegulatorIC,LDO Voltage Regulator ROHM. | |
| 6 | U209 | IC,Voltage Reference | EUSY0410801 | RT9524 DFN,10,R/TP,DFN Cal Test Mode Single Charger IC for Micro USB,IC,ChargerIC,Charger RICHTEK TECHNOLOGY CORP. | |
| 6 | U401 | IC,Digital Signal Processors | EUSY0412901 | PMB8805 0 0 0 NONE NONE BGA R/TP 207P - INFINEON TECHNOLOGIES (ASIA PACIFIC) PTE LTD. | |
| 6 | U501 | IC,Resistive Touch Screen Controller | EUSY0416201 | ISA2000 NONE NONE UQFN R/TP 18P - Imagis Co.,Ltd. | |
| 6 | U600 | IC,Bluetooth | EUSY0418701 | BCM2070B2KUBXG 2.3VTO5.5V 158.4mW WLBGA R/TP 42P - BROADCOM ASIA DISTRIBUTION PTE LTD | |

| Level | Location No. | Description | Part Number | Spec | Remark |
|---|---|---|---|---|---|
| 6 | U101 | IC,Digital Signal Processors | EUSY0421201 | PMB8810 0 0 0 NONE NONE BGA R/TP 217P - INFINEON TECHNOLOGIES (ASIA PACIFIC) PTE LTD. | |
| 6 | U100 | IC,MCP,NOR | EUSY0421701 | KA8520N00A-BWWW NOR/1GBIT(512M*2) + PSRAM/256MBIT 1.7VTO1.9V 8□9.2□1.2 TR 56P - - - SAMSUNG ELECTRONIC CO.,LTD | |
| 6 | U402 | IC,MCP,NOR | EUSY0422102 | S71VS128RC0AHK4L0 7.7*6.2*1 ,56 ,ETC ,128Mb NOR+ 64Mb psRAM, Admux, 1.8V ,; ,IC,MCP SPANSION LLC | |
| 6 | X101,X401 | Crystal | EXXY0018701 | FC-135(12.5PF, +-20PPM) 32.768KHZ 20PPM 12.5PF 32*15 SMD R/TP SEIKO EPSON CORP | |
| 6 | X100,X400 | Crystal | EXXY0027001 | DSX321G-26M(8PF) 26MHZ 10PPM 0F NONE SMD R/TP DAISHINKU CORPORATION. | |
| 6 | R216,R218, R293,R405, R408,R409, R411,R412, R447,R603, R626 | Wire Pad,Open | SAFO0000501 | AX3100 ATL SV_SHIPBACK,MAIN,A,0OHM_1005_DNI | |
| 6 | R400 | Wire Pad,Short | SAFP0000401 | AX3100 ATL SV_SHIPBACK,MAIN,A | |
| 6 | R100,R215, R235,R294, R295,R602 | Wire Pad,Short | SAFP0000501 | LG-VS760 VRZ | |
| 6 | VA501 | Varistor | SEVY0000701 | EVL14S02200 14V 0% 120F 1.0*0.5*0.6 NONE SMD R/TP AMOTECH CO., LTD. | |
| 6 | VA202, VA203, VA503 | Varistor | SEVY0001001 | EVLC14S02050 14V 0% 50F 1.0*0.5*0.6 NONE SMD R/TP AMOTECH CO., LTD. | |
| 6 | VA200, VA201, VA506 | Varistor | SEVY0007301 | ULCE0505C015FR 5V 0% 0.5F 1.0*0.5*0.55 NONE SMD R/TP INNOCHIPS TECHNOLOGY | |
| 6 | FB600 | Filter,Bead | SFBH0000903 | HB-1M1005-601JT 600 ohm 1.0*0.5*0.5 SMD R/TP 2P CERATECH CORPORATION | |
| 6 | FB200, FB201, FB202, FB300, FB500, FB501, FB502 | Filter,Bead | SFBH0000912 | HB-1M1005-102JT 1000 ohm 1.0*0.5*0.5 SMD R/TP 2P CERATECH CORPORATION | |
| 6 | FB100, FB400 | Filter,Bead | SFBH0007103 | BLM15BB750SN1J 75ohm 1.0x0.5x0.55 SMD R/TP 2P MURATA MANUFACTURING CO.,LTD. | |
| 6 | FL600 | Filter,Dielectric | SFDY0003001 | DEA202450BT-1275A1 DEA202450BT-1275A1,2450 MHz,2.0*1.25*1.05,SMD,2400M~2500M,IL 1.6,4pin,U-U,50-50,BT BPF TDK CORPORATION | |
| 6 | FL503, FL504 | Filter,EMI/Power | SFEY0011601 | ICVE10184E150R500FR ESD/EMI 0HZ 15pF 0H SMD R/TP INNOCHIPS TECHNOLOGY | |
| 6 | FL500, FL501, FL502 | Filter,EMI/Power | SFEY0013201 | EVRC14S03Q030100R ESD/EMI 0HZ 15pF 0H SMD R/TP AMOTECH CO., LTD. | |

# 12. EXPLODED VIEW & REPLACEMENT PART LIST

| Level | Location No. | Description | Part Number | Spec | Remark |
|---|---|---|---|---|---|
| 6 | FL301, FL303 | Filter,Saw,Dual | SFSB0002301 | B9509 B9509,881.5 MHz,25 MHz,2.6 dB,30 dB,942.5 MHz,35 MHz,30 dB,15 dB,1.8*1.4*0.68,SMD,869M~894M,925M~960M,10p,B,150,LH,GSM850+EGSM Rx,DIP_OUT EPCOS PTE LTD. | |
| 6 | FL300, FL302 | Filter,Saw,Dual | SFSB0002302 | B9508 B9508,1842.5 MHz,75 MHz,3.5 dB,10 dB,1960 MHz,60 MHz,3.5 dB,10 dB,1.8*1.4*0.68,SMD,1805M~1880M,1930M~1990M,10p,B,100,DCS+PCS Rx,LH,DIP_OUT EPCOS PTE LTD. | |
| 6 | U301,U302 | RF Module | SMRH0005601 | SKY77547 MHz,MHz,GSM Quad Tx Module 6x8, SKYWORKS SOLUTIONS INC. | |
| 6 | BAT100 | Module,Assembly | SMZY0026701 | EECEP0F333YD GM750 SFRTN Backup Capacitor,0.03F,3.8pi,Module Assembly PANASONIC INDUSTRIAL KOREA CO., LTD | |
| 6 | ANT600 | Antenna,Helical | SNMF0051501 | SDBTPTR3015 SINGLE -5DB 50OHM 5 PARTRON COMPANY LIMITED | |
| 6 | MIC200 | Microphone, Condenser | SUMY0010613 | S08OT423-06 -42DB 100OHM OMNI 1.5 TO 3.6V 3.76x2.95x1.1 SMD GoerTek Inc. | |
| 5 | SAFD00 | PCB Assembly, Main,SMT Top | SAFD0150701☞ 2 | LGP520.ACISBK MAIN 1.0 | |
| 6 | CN501 | Connector, Terminal Block | ENZY0020701 | KQ13L-4R 4P 2.7 ANGLE SMD R/TP - HIROSE KOREA CO.,LTD | |
| 6 | PCB | PCB,Main | SPFY0237101 | SPFY0237101 FR-4 Staggered via STAGGERED-8 0.8 LG-P520 CISBK,MAIN,D,FR-4,0.8 mm,STAGGERED-8 ISUPETASYS | |
| 3 | SNGF00 | Antenna,Helical | SNGF0065501 | LS01-I-10LGP520(MRD)-A0 3,-2 dBd,Triple(GSM900/DCS/PCS),TRIPLE,-2,50,3 LS Mtron Ltd. | |
| 2 | MEZ002101 | Label,Approval | MLAA0062305 | COMPLEX KB770 DEUBK ZZ:Without Color - | |
| 2 | MEZ002100 | Label,Approval | MLAA0062401 | COMPLEX KE970 CISSS ZZ:Without Color - | |

## 12.3 Accessory

**Note**: This Chapter is used for reference, Part order is ordered by SBOM standard on GCSC

| Level | Location No. | Description | Part Number | Spec | Remark |
|---|---|---|---|---|---|
| 3 | SAC000000 | PCSYNC CD | SAC35035301 | PC Sync CD Part Create CD n/a CD n/a | |
| 2 | EBX000000 | Accessory, Data Cable | SGDY0016701 | KCA-ET-8-0020 KCA-ET-8-0020 Micro USB, 1.2M KSD CO., LTD | |
| 2 | EAB010200 | Earphone,Stereo | SGEY0003218 | EMB-LGE011STKC 3mW 16OHM 115DB 85HZTO126HZ 1M BLACK 5PIN 5 CRESYN CO.,LTD | |
| 2 | EAY060000 | Adapters | SSAD0032201 | STA-U12RD STA-U12RD,100-240V,5060 Hz,5.1 V,0.7 A,CE,GOST,STA-U12RD,Russia,Cableless DONG DO ELECTRONICS CO., LTD | |
| 2 | EAY060000 | Adapters | *S*SSAD0032202 | STA-U12RS 150Vac~350Vac 5.1V 700mA 5060 GOST NONE NONE - SALCOMP OY | |